FRY'S PURE CONCENTRATED COCOA.

THE PRACTICAL TEACHER

With which is incorporated

The Practical Teacher's Art Monthly

October 1909

THOMAS NELSON & SONS LONDON
EDINBURGH·DUBLIN
& NEW YORK

VOL. XXX No. 4

PRICE 6D.

. . THE . .

"SINGER" IN SEWING CLASSES.

IN THE BOARD OF EDUCATION'S SUGGESTIONS TO TEACHERS—RECENTLY PUBLISHED—
A WIDER USE OF THE SEWING MACHINE IN SCHOOLS IS ADVOCATED.
(See Suggestion No. 18 in Circular 730.)

Throughout the entire world there are more Singer Sewing Machines in use than all other makes combined, and in Great Britain alone the number is considerably greater than all other makes put together—indisputable evidence of the superiority of the Singer Sewing Machine.

This is why the girls should be taught to sew upon a "Singer." It is, without doubt, the machine they will use in after life; and wherever the pupil may eventually reside, there will be found a Singer Shop ready to attend to her Sewing Machine requirements, and supply lost Parts, Needles, Oil, Cotton, Etc.

That the "Singer" is recognised as being the best Sewing Machine for school use is evidenced by the fact that in over 3,000 Schools and Kindred Institutions throughout Great Britain and Ireland, more than 7,000 Singer Sewing Machines are already in daily use.

The Singer Sewing Machine is British Made by British Labour in the largest Sewing Machine Factory in the World, situated at Singer, near Glasgow.

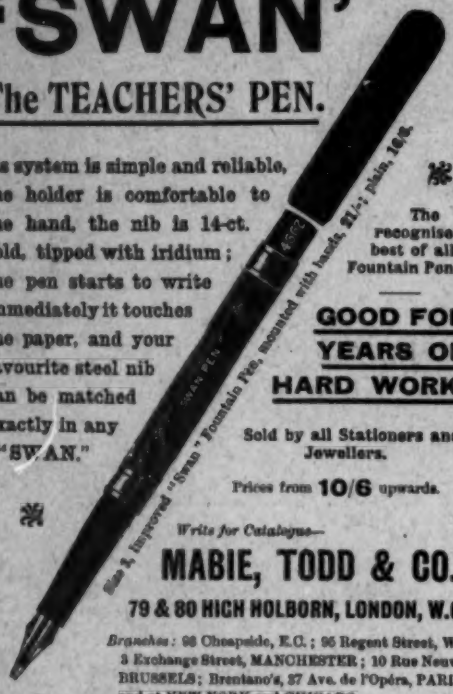
Special Terms will be offered in connection with Sewing Machines for Class Room use.

SINGER SEWING MACHINE COMPANY, LIMITED.
Shops in Every City.

'SWAN'

The TEACHERS' PEN.

Its system is simple and reliable, the holder is comfortable to the hand, the nib is 14-ct. gold, tipped with iridium; the pen starts to write immediately it touches the paper, and your favourite steel nib can be matched exactly in any "SWAN."



The recognised best of all Fountain Pens.

GOOD FOR YEARS OF HARD WORK.

Sold by all Stationers and Jewellers.

Prices from **10/6** upwards.

Write for Catalogue—

MABIE, TODD & CO.,
79 & 80 HIGH HOLBORN, LONDON, W.C.

Branches: 93 Cheapside, E.C.; 95 Regent Street, W.; 3 Exchange Street, MANCHESTER; 10 Rue Neuve, BRUSSELS; Brentano's, 37 Ave. de l'Opéra, PARIS; and at NEW YORK and CHICAGO.

CHAS. GRIFFIN & CO., LTD., PUBLISHERS.

JUST PUBLISHED. ***IN FOUR VOLUMES.***
In Crown 8vo. Cloth. Fully Illustrated.

AN ELEMENTARY
TEXT-BOOK OF PHYSICS.
By R. WALLACE STEWART, D.Sc.

JUST PUBLISHED.	**LIGHT.**	Price 3s. 6d. net.
JUST PUBLISHED.	**SOUND.**	Price 2s. 6d. net.
AT PRESS.	**HEAT.**	Ready Immediately.
AT PRESS.	**MATTER.**	Ready Shortly.

ELEMENTARY WORKS BY PROF. A. JAMIESON.
3s. 6d. each. In Crown 8vo. Fully Illustrated. **3s. 6d. each.**
Each volume containing numerous examples and questions.

STEAM AND THE STEAM ENGINE.
"Should be in the hands of every engineering apprentice."—*Practical Engineer.*

MAGNETISM AND ELECTRICITY.
"A thoroughly trustworthy text-book.....practical and clear."—*Nature.*

APPLIED MECHANICS.
"The work has very high qualities.....clear."—*Science and Art.*

Fifth Edition. In Two Volumes. Sold Separately.

A TEXT-BOOK OF
ENGINEERING DRAWING AND DESIGN.
By SIDNEY H. WELLS, Wh.Sc., A.M.I.C.E., Etc.
Vol. I. Practical Geometry, Plane and Solid. 4s. 6d.
Vol. II. Machine and Engine Drawing and Design. 4s. 6d.
"A capital text-book."—*Electrical Review.*

LONDON: C. GRIFFIN & CO., LTD., EXETER ST., STRAND.

1910
LIBRARY

THE
PRACTICAL TEACHER

With which is incorporated
THE PRACTICAL TEACHER'S ART MONTHLY

Vol. XXX. No. 4. OCTOBER, 1909. Price 6d.

Notices to Correspondents and Subscribers.

"The Practical Teacher" may be ordered of any Newsagent or Bookseller, or at any Bookstall, in the United Kingdom or in the Colonies. Supplies are sent monthly to the chief towns in Australasia, South Africa, and India.

London Office: 35 and 36 Paternoster Row.
Edinburgh Office: Parkside Works.
Dublin Office: 17 Talbot Street.
New York Office: 37 East 18th Street.
Paris: W. H. Smith and Son, 248 Rue de Rivoli.

Subscribers may obtain "The Practical Teacher," post free, from the Publishers at the following terms:—

United Kingdom, Continent, Colonies, and United States } 12 Months, 8/- 6 Months, 4/-

All literary communications should be addressed to the Editor, Office of "The Practical Teacher," 35 and 36 Paternoster Row, London, E.C.

Remittances, Cheques, Post-Office Orders, etc., should be made payable to Thomas Nelson and Sons. Advertisement rates on application.

CONTENTS.

Educational Opinion. By Verax . . . 174

N.U.T. Notes. By Allen Croft . . . 175

The New Constructive Movement—
- Suggestions from American Schools. By W. H. Winch, M.A. . . . 176
- The Constructive Movement in Elementary Schools. By Arthur W. Bull . . . 177
- Constructive Work for Standards III. and IV. By C. T. Hunt . . . 178
- Spanning the Gulf; or, Kindergarten Instruction for the Upper Standards. By H. G. Styles . 179
- An Educational Excursion to the Isle of Wight. By E. G. Bowe . . . 181
- The late Mr. W. F. Stanley . . . 183

Seasonal Lessons in Nature Study. By Rev. Alfred Thornley, M.A., F.L.S., F.E.S. —Botanical Study: The Leaf . . . 183

Geography Notes Up-to-date. By E. R. Wethey, M.A., F.R.G.S.—Cook's North Pole —The Advance of Fishguard—The Panama Canal Up-to-date—Is the Climate of Egypt changing? . . . 186

Our Art and Handwork Section—
- Painters and Pictures. By W. E. Sparkes.—XIII. J. L. E. Meissonier—XIV. A. C. Gow, R.A. . . . 189
- Editorial Note . . . 193
- Honours Page . . . 193
- The History Lesson and Drawing. By W. H. Elgar . . . 195
- Drawing in Public Schools. By W. Ryle Smith . 201
- Nature Studies . . . 204

Notes and Suggestions on the Teaching of Experimental Science, Mathematics, and Drawing. By C. Hamilton 205

Edwin of Deira. Historical Play for Schools in Four Scenes. By J. Edward Parrott, M.A., LL.D. . . . 207

Agricultural Education. By W. Francis Rankine . . . 210

Our Cookery Column. By Rosamond Candy 211

Our Readers' Column—
- Studies of Books that are worth while. By Susan Cunnington . . . 213

Education a Failure!—
- The Junior Curriculum. By John Perkins . . 215

A Correlated Scheme based upon Æsop's Fables . . . 216

Our Query Column—
- Replies to Timmy—Etienne—François—Chelt—Trigonometry—Imperator—Devodalry . . 219

Modern Science Notes. By J. G. McIntosh, B.Sc.—The British Association Meeting of 1909—A New Sodium Flame—Magnetism of Gases and Vapours—A Kinematical Illusion —Board of Education Examinations . . 222

French Prize Competition . . . 224

A Course in History and Literature. By Mabel A. Brown . . . 225

A Tale for the Story Hour. The Story of an "Okosama." By Ken Hoshino . . 226

A Hypsometrical Map of Ingleborough 228

Supplement—
- Questions in Experimental Science, Mathematics, and Drawing. By C. Hamilton . . . 1–7

Educational Opinion.

THE welcome given in these columns last month to the findings of the Inter-Departmental Committee on Half-Timers was prophetic. We frankly confess that we hardly expected a Committee's report to be followed so swiftly by the promise of action. And we are all the more grateful to Mr. Runciman for his promise of a Bill dealing with the subject next session. Child labour is a "blot on the 'scutcheon" of any nation; in a great and rich country like England it is even worse. When it has been wiped out, perhaps even those who still fight for its continuance will be brought to see and acknowledge the error of their opinions. For there are better things in life than "addlin' brass," especially when that "brass" is the price of the physical, intellectual, and moral development of young children. The final disappearance of the Half-Timer will be hailed with joy by many a teacher who has worked hard to secure it.

A Welcome Promise.

❧ ❧ ❧

A PRONOUNCEMENT has at last been made on the conditions under which service in the Colonies may count as fulfilling the terms of the undertaking given by students-in-training. None too soon. We know of two colleges at least where, with the difficulty of obtaining posts staring students in the face, the principals entered three months back into negotiations with the Education Authorities of Canada and South Africa with a view to placing outgoing students in service there. And, what is more to the point, the Education Minister of Alberta spent some time in England this summer, visiting some of our training colleges. The negotiations were always rendered difficult by the conflict between service in the Colonies and the terms of the "undertaking." If, as Lord Crewe has now informed the respective Governors, the Board of Education will accept service in Colonial schools as fulfilling all requirements, we may expect to see "free trade within the Empire" in teachers become the order of the day. The project was mooted at the Conference of the Empire League in Caxton Hall a year ago, but official difficulties have hitherto stood in the way. These have now been removed.

Free Trade in Teachers.

❧ ❧ ❧

CIRCULAR 730, an instalment of the revised "Suggestions" dealing with the teaching of needlework in schools, may be expected to cause some little stir and comment. It aims at making the work much more practical and immediately useful* than it has hitherto been, and incidentally it gives the "happy dispatch" to some practices which have crept into the needlework lesson—for example, counting threads, etc. In one respect it seems to us hardly to go far enough. Regarding girls under six years of age the Circular says: "It is not compulsory" for them to be taught to sew. It ought not even to be optional. In all matters of handwork for little children there has been a tendency to disregard the very plain lessons of physiology and psychology in allowing tiny youngsters in the most delicate stage of brain and muscle development to attempt all sorts of fine and complicated muscular actions. The handling and use of a needle, even of large size, is one of these complexes of fine movements, and in the infants' school it ought to be "taboo." Irreparable damage may be done by attempting in one stage of development work of any kind which is only suited to a further and later stage.

Needlework in Schools—

* As our lady readers are aware, we have made a consistent practice of taking this line with regard to needlework in articles published in this paper. The Editor has now in hand other papers by Miss Fleming written on similar lines, and hopes to print one of these next month.

❧ ❧ ❧

WITH regard to the teaching of needlework, we should like to see some hint given of the advisability of a change in the practice of the work during a training college course. As at present carried out, it demands a very large slice of the limited time which a two years' course gives, and we have no hesitation in saying that much of the time is wasted for all practical purposes. What is worse, women students who are preparing to teach girls, and those who intend to become teachers of infants, go through the same elaborate and time-costly course. A saner plan would be to allow both to follow the same course for a time and then bifurcate—infants' teachers to continue in a course of the handwork so necessary in the lower portion of the school; though here again care will be necessary to prevent the handwork from repeating the unphysiological character of needlework for infants. And we see no reason why, among girls' teachers, needlework should not be regarded as a specialist's subject, in which those who possess definite aptitude could gain a special qualification. Some branches of school work are best met by an *ad hoc* re-classification of the school—for example, drawing, where the presence of those on the staff who are specially qualified in it is a positive necessity. Needlework seems to us to be one of these branches.

And in Training Colleges.

❧ ❧ ❧

ONE of the most curious features of the recent uprising in Spain was the attack on conventual schools and institutions for the young. At first sight this would seem to be mere madness, but much lies underneath, hidden from the casual glance. Spain has a system of primary education ostensibly complete and compulsory. In practice it is neither. The instruction is poorly organised, the equipment and accommodation worse, the condition of the teaching staff worst of all, and compulsion really non-existent. The teachers are wretchedly paid, and until the duty of paying them was taken out of the hands of the provincial authorities their pay was often in arrears. The monkish orders have started schools in the towns, where they flourish, and have entered into competition with the State schools. But for many reasons, into which it would be too wearying to go, the orders are in very bad odour in Spain. The political factions in Catalonia have started schools of their own, distrusting the monkish institutions and the dogmatic instruction which is given in them. So there is a sort of triangular school duel going on.

The Spanish Schoolmaster.

ONCE again is seen the tremendous importance of the early education of youth in any country, and at the same time the eagerness of all parties, political or religious, to secure a monopoly of it. When once the trouble broke out, it took the form of an explosion of popular rage against the religious orders, and this time the rage was vented not only on monasteries and churches, but on schools. It is a state of things which in England is hard to realise. The Government has retaliated by closing the schools opened by political parties and factions. So here we have in the country which is almost the most illiterate in the civilised world, a war of reprisal and retaliation going on around its schools, and depriving some parts of it, for at any rate some considerable time, of any possibility of educating their children. The illiteracy of Spain is shocking, and under present conditions it does not look as though it would improve. But if any further evidence were wanted of the tremendous influence of its primary schools on the fate of any nation, you have only to look to-day at Spain.

The Omnipotent Primary School.

N.U.T. NOTES.

BY ALLEN CROFT.

THE Consultative Committee of the Board of Education consists to-day of twenty-one members, the majority of whom are men and women whose names are "household words" with educationists. Its present chairman is the Right Hon. A. H. Dyke Acland, whose *régime* at Whitehall in the early 'nineties will not be forgotten by a generation of grateful teachers. Among the ladies, Mrs. Sophie Bryant, Miss Lydia Manley, and our own potential Vice-President, Miss Cleghorn, stand pre-eminent; whilst Sir Henry J. Hibbert, the Right Hon. Henry Hobhouse, Mr. D. J. Shackleton, M.P., Mr. Albert Mansbridge, Mr. J. L. Paton, Professor M. E. Sadler, Principal Sir Harry Reichel, Mr. Marshall Jackman, and Mr. George Sharples are amongst the best known of the sterner sex.

The Consultative Committee—

Two and a half years ago the Committee was requested to consider and advise the Board of Education "as to whether any means, and if so what, can be devised, in respect of rural areas and urban areas respectively, for securing (1) that a much larger proportion of boys and girls should, on leaving the public elementary school, commence and continue attendance at evening schools than at present do so; and (2) that employers and other persons or bodies in a position to give effective help shall co-operate in arranging facilities for such attendance on the part of their employees, and in planning suitable courses and subjects for the schools and classes." How well and how thoroughly the Committee performed its responsible task can only be learned from a perusal of the seven hundred or so pages contained in a couple of volumes issued last month, and it was with peculiar satisfaction that, at a meeting of the Sub-Committee appointed by the Executive to examine and report on the contents of these two volumes, I moved a resolution expressive of our high appreciation of the labours of the Consultative Committee and our entire approbation of the general tenor of the published recommendations.

CERTAINLY the Committee spared no pains to ascertain the views of experienced witnesses from all parts of the country, including representative employers from many important industries and occupations, representatives of labour, representatives of public services—that is, the Army, the Navy, the Scotch Office, the Post Office, and the Board of Agriculture—representatives of Local Education Authorities, teachers of every description, inspectors of schools, women witnesses, persons specially qualified to give evidence on economics and sociology, persons specially interested in lads in miscellaneous occupations (such as district messengers and golf caddies) and in lads' clubs; and in addition to receiving oral evidence, the Committee visited some of the chief industrial districts in the north of England, the Midlands, South Wales, and Scotland.

On Continuation Schools.

I have already stated that the Executive's Sub-Committee generally approved of the recommendations, but on the vital question of *compulsory* attendance at continuation schools we came to the conclusion that before this was possible or advisable the exemption age for day scholars must be statutorily raised to fourteen. Those who seem to wish to see children leave school as early as possible would find in compulsory attendance at evening schools a formidable weapon with which to resist *any* future raising of the age for day school exemption.

Our own Sub-Committee looked with much suspicion on the suggestion that Local Education Authorities should establish classes "in which persons who are already teachers should be trained in the more specialised parts of the work of the continuation schools, and in which experts in such subjects may be trained in the art of teaching," and we emphatically condemned the suggested differentiation in the application of the attendance laws in agricultural and urban areas.

My personal hope is that Mr. Runciman will deal as promptly with the Consultative Committee's recommendations as he has expressed his intentions of doing with those concerning "Half Time;" and it is almost unnecessary to add that the whole Parliamentary influence of the Union will be gladly placed at his disposal to assist in abolishing the "little white slaves."

G. K. CHESTERTON ON THE TOPIC OF THE HOUR.

"THE finding of the North Pole is a really suitable subject for a column such as this" ("Our Note Book," in the *Illustrated London News*), "because it cannot possibly matter a rap to any reasonable human being whether it has been discovered or not. It is a safe and soothing subject; there is no heat about the North Pole. Certainly people have killed themselves trying to find the North Pole, but that does not make the matter particularly serious; they have killed themselves in trying to find a fox. A fox is a much more solemn and sacred affair than the Pole; it is alive and runs about, while the Pole (I think) keeps still; but I am not a scientist. What the people in question were really hunting was neither the Pole nor the fox, but fun: a philosophical abstraction. I do not sneer at Polar explorers; I admire them as I do all romantic lunatics. But it is really funny to hear men of science gibe at those superstitions which hold sacred the words of a prophet or the blood of a martyr, and then talk quite seriously about killing whole shiploads of human beings in order to find an object which isn't there when you get to it, and which is already in the maps—in the only place where it could ever be useful."

Educational Opinion.

THE welcome given in these columns last month to the findings of the Inter-Departmental Committee on Half-Timers was prophetic. We frankly confess that we hardly expected a Committee's report to be followed so swiftly by the promise of action. And we are all the more grateful to Mr. Runciman for his promise of a Bill dealing with the subject next session. Child labour is a "blot on the 'scutcheon" of any nation; in a great and rich country like England it is even worse. When it has been wiped out, perhaps even those who still fight for its continuance will be brought to see and acknowledge the error of their opinions. For there are better things in life than "addlin' brass," especially when that "brass" is the price of the physical, intellectual, and moral development of young children. The final disappearance of the Half-Timer will be hailed with joy by many a teacher who has worked hard to secure it.

A Welcome Promise.

* * *

A PRONOUNCEMENT has at last been made on the conditions under which service in the Colonies may count as fulfilling the terms of the undertaking given by students-in-training. None too soon. We know of two colleges at least where, with the difficulty of obtaining posts staring students in the face, the principals entered three months back into negotiations with the Education Authorities of Canada and South Africa with a view to placing outgoing students in service there. And, what is more to the point, the Education Minister of Alberta spent some time in England this summer, visiting some of our training colleges. The negotiations were always rendered difficult by the conflict between service in the Colonies and the terms of the "undertaking." If, as Lord Crewe has now informed the respective Governors, the Board of Education will accept service in Colonial schools as fulfilling all requirements, we may expect to see "free trade within the Empire" in teachers become the order of the day. The project was mooted at the Conference of the Empire League in Caxton Hall a year ago, but official difficulties have hitherto stood in the way. These have now been removed.

Free Trade in Teachers.

* * *

CIRCULAR 730, an instalment of the revised "Suggestions" dealing with the teaching of needlework in schools, may be expected to cause some little stir and comment. It aims at making the work much more practical and immediately useful* than it has hitherto been, and incidentally it gives the "happy dispatch" to some practices which have crept into the needlework lesson—for example, counting threads, etc. In one respect it seems to us hardly to go far enough. Regarding girls under six years of age the Circular says: "It is not compulsory" for them to be taught to sew. It ought not even to be optional. In all matters of handwork for little children there has been a tendency to disregard the very plain lessons of physiology and psychology in allowing tiny youngsters in the most delicate stage of brain and muscle development to attempt all sorts of fine and complicated muscular actions. The handling and use of a needle, even of large size, is one of these complexes of fine movements, and in the infants' school it ought to be "taboo." Irreparable damage may be done by attempting in one stage of development work of any kind which is only suited to a further and later stage.

Needlework in Schools—

* * *

WITH regard to the teaching of needlework, we should like to see some hint given of the advisability of a change in the practice of the work during a training college course. As at present carried out, it demands a very large slice of the limited time which a two years' course gives, and we have no hesitation in saying that much of the time is wasted for all practical purposes. What is worse, women students who are preparing to teach girls, and those who intend to become teachers of infants, go through the same elaborate and time-costly course. A saner plan would be to allow both to follow the same course for a time and then bifurcate—infants' teachers to continue in a course of the handwork so necessary in the lower portion of the school; though here again care will be necessary to prevent the handwork from repeating the unphysiological character of needlework for infants. And we see no reason why, among girls' teachers, needlework should not be regarded as a specialist's subject, in which those who possess definite aptitude could gain a special qualification. Some branches of school work are best met by an *ad hoc* re-classification of the school—for example, drawing, where the presence of those on the staff who are specially qualified in it is a positive necessity. Needlework seems to us to be one of these branches.

And in Training Colleges.

* * *

ONE of the most curious features of the recent uprising in Spain was the attack on conventual schools and institutions for the young. At first sight this would seem to be mere madness, but much lies underneath, hidden from the casual glance. Spain has a system of primary education ostensibly complete and compulsory. In practice it is neither. The instruction is poorly organised, the equipment and accommodation worse, the condition of the teaching staff worst of all, and compulsion really non-existent. The teachers are wretchedly paid, and until the duty of paying them was taken out of the hands of the provincial authorities their pay was often in arrears. The monkish orders have started schools in the towns, where they flourish, and have entered into competition with the State schools. But for many reasons, into which it would be too wearying to go, the orders are in very bad odour in Spain. The political factions in Catalonia have started schools of their own, distrusting the monkish institutions and the dogmatic instruction which is given in them. So there is a sort of triangular school duel going on.

The Spanish Schoolmaster.

* As our lady readers are aware, we have made a consistent practice of taking this line with regard to needlework in articles published in this paper. The Editor has now in hand other papers by Miss Fleming written on similar lines, and hopes to print one of these next month.

The Omnipotent Primary School.

ONCE again is seen the tremendous importance of the early education of youth in any country, and at the same time the eagerness of all parties, political or religious, to secure a monopoly of it. When once the trouble broke out, it took the form of an explosion of popular rage against the religious orders, and this time the rage was vented not only on monasteries and churches, but on schools. It is a state of things which in England is hard to realise. The Government has retaliated by closing the schools opened by political parties and factions. So here we have in the country which is almost the most illiterate in the civilised world, a war of reprisal and retaliation going on around its schools, and depriving some parts of it, for at any rate some considerable time, of any possibility of educating their children. The illiteracy of Spain is shocking, and under present conditions it does not look as though it would improve. But if any further evidence were wanted of the tremendous influence of its primary schools on the fate of any nation, you have only to look to-day at Spain.

N.U.T. NOTES.

BY ALLEN CROFT.

The Consultative Committee—

THE Consultative Committee of the Board of Education consists to-day of twenty-one members, the majority of whom are men and women whose names are "household words" with educationists. Its present chairman is the Right Hon. A. H. Dyke Acland, whose *régime* at Whitehall in the early 'nineties will not be forgotten by a generation of grateful teachers. Among the ladies, Mrs. Sophie Bryant, Miss Lydia Manley, and our own potential Vice-President, Miss Cleghorn, stand pre-eminent; whilst Sir Henry J. Hibbert, the Right Hon. Henry Hobhouse, Mr. D. J. Shackleton, M.P., Mr. Albert Mansbridge, Mr. J. L. Paton, Professor M. E. Sadler, Principal Sir Harry Reichel, Mr. Marshall Jackman, and Mr. George Sharples are amongst the best known of the sterner sex.

Two and a half years ago the Committee was requested to consider and advise the Board of Education "as to whether any means, and if so what, can be devised, in respect of rural areas and urban areas respectively, for securing (1) that a much larger proportion of boys and girls should, on leaving the public elementary school, commence and continue attendance at evening schools than at present do so; and (2) that employers and other persons or bodies in a position to give effective help shall co-operate in arranging facilities for such attendance on the part of their employees, and in planning suitable courses and subjects for the schools and classes." How well and how thoroughly the Committee performed its responsible task can only be learned from a perusal of the seven hundred or so pages contained in a couple of volumes issued last month; and it was with peculiar satisfaction that, at a meeting of the Sub-Committee appointed by the Executive to examine and report on the contents of these two volumes, I moved a resolution expressive of our high appreciation of the labours of the Consultative Committee and our entire approbation of the general tenor of the published recommendations.

On Continuation Schools.

CERTAINLY the Committee spared no pains to ascertain the views of experienced witnesses from all parts of the country, including representative employers from many important industries and occupations, representatives of labour, representatives of public services—that is, the Army, the Navy, the Scotch Office, the Post Office, and the Board of Agriculture—representatives of Local Education Authorities, teachers of every description, inspectors of schools, women witnesses, persons specially qualified to give evidence on economics and sociology, persons specially interested in lads in miscellaneous occupations (such as district messengers and golf caddies) and in lads' clubs; and in addition to receiving oral evidence, the Committee visited some of the chief industrial districts in the north of England, the Midlands, South Wales, and Scotland.

I have already stated that the Executive's Sub-Committee generally approved of the recommendations, but on the vital question of *compulsory* attendance at continuation schools we came to the conclusion that before this was possible or advisable the exemption age for day scholars must be statutorily raised to fourteen. Those who seem to wish to see children leave school as early as possible would find in compulsory attendance at evening schools a formidable weapon with which to resist *any* future raising of the age for day school exemption.

Our own Sub-Committee looked with much suspicion on the suggestion that Local Education Authorities should establish classes "in which persons who are already teachers should be trained in the more specialised parts of the work of the continuation schools, and in which experts in such subjects may be trained in the art of teaching," and we emphatically condemned the suggested differentiation in the application of the attendance laws in agricultural and urban areas.

My personal hope is that Mr. Runciman will deal as promptly with the Consultative Committee's recommendations as he has expressed his intentions of doing with those concerning "Half Time;" and it is almost unnecessary to add that the whole Parliamentary influence of the Union will be gladly placed at his disposal to assist in abolishing the "little white slaves."

G. K. CHESTERTON ON THE TOPIC OF THE HOUR.

"THE finding of the North Pole is a really suitable subject for a column such as this" ("Our Note Book," in the *Illustrated London News*), "because it cannot possibly matter a rap to any reasonable human being whether it has been discovered or not. It is a safe and soothing subject; there is no heat about the North Pole. Certainly people have killed themselves trying to find the North Pole, but that does not make the matter particularly serious; they have killed themselves in trying to find a fox. A fox is a much more solemn and sacred affair than the Pole; it is alive and runs about, while the Pole (I think) keeps still; but I am not a scientist. What the people in question were really hunting was neither the Pole nor the fox, but fun: a philosophical abstraction. I do not sneer at Polar explorers; I admire them as I do all romantic lunatics. But it is really funny to hear men of science gibe at those superstitions which hold sacred the words of a prophet or the blood of a martyr, and then talk quite seriously about killing whole shiploads of human beings in order to find an object which isn't there when you get to it, and which is already in the maps—in the only place where it could ever be useful."

The New Constructive Movement.

WHAT IS BEING DONE IN THE MOST PROGRESSIVE SCHOOLS TO MAKE THE PRIMARY TEACHING TOUCH EVERYDAY LIFE AT ALL POINTS.

SUGGESTIONS FROM AMERICAN SCHOOLS.

BY W. H. WINCH, M.A.

THERE is much dispute nowadays as to the correlation of subjects in school instruction. Theoretically there have always been those who claim that without correlation of studies there can be very little really deserving the name of knowledge. We must, of course, readily admit that the more we know and the more we are able to put what we know together and to deduce new knowledge from our old knowledge, the better educated we are. It is sometimes said—a little paradoxically, perhaps—that the true test of an educated man is furnished not by his proficiency in what he has thoroughly studied, but by his power to apprehend in a critical way any new knowledge that may be presented to him. All philosophers and all first-rate administrators possess this power. So I suppose, as the coping-stone and crowning work of the edifice of knowledge, we should aim, as far as we can, at cultivating this power of interpreting one kind of knowledge with another, and the habit of drawing out the relations between them. Still all this, though true enough, is not very helpful to practical teachers of young children. They are well aware that those who preach correlation to them advise correlation methods not only at the end but at the beginning of study. And they are rendered a little suspicious because it mostly turns out that the enthusiastic correlationist has some one subject in mind—sometimes history or fairy stories, sometimes science, sometimes drawing—with which all other subjects are to be correlated. And in practice the teachers know very well that, if pushed to its limit, progress in all other subjects is sacrificed to proficiency in the favoured one. With that sort of correlation we shall, in *The Practical Teacher*, have nothing to do. But let it not be supposed for one moment that I am contending that there should be no correlation of school studies. On the contrary, I believe that, wherever the material of one subject becomes appropriately illustrative of another subject, in every such case correlation methods should be adopted, especially where all the subjects may be brought to bear together on the practical issues of life. The New Constructive Movement is largely the outcome of such educational ideas as these.

To make something and gather up within that making all the necessary contributory knowledge—knowledge finding a value and use in active function—that is the end prescribed by modern educational philosophy. I need not, perhaps, again warn my reader that it is not merely the making of things which the educational philosopher has in mind, but all true construction, intellectual as well as material.

But to-day we are going to consider one aspect only of constructive work and one aspect only of the correlation of subjects; and I shall, as usual, deal with it by actual example. Actual examples, if taken from real life and not manufactured, are frequently full of faults, as the readers of these papers who have considered them critically are, no doubt, well aware. But actual examples have always these advantages: In the first place, we can learn more easily from them than from abstract accounts of things; and in the second place, we have the comforting feeling that we are dealing with what is not only possible but actual. I shall first trace in outline an object lesson in constructive work which I heard in a school in Manhattan.

NEW YORK, ELEMENTARY BOYS' SCHOOL.

Grade I. Forty children were present, some of six and some of seven years of age.

The yearly course was grouped about a number of specified objects, four lessons being given on each one. The objects were chosen so as to be within the opportunity of the daily knowledge of the little ones, and there was an entire absence of that analysis into qualities—opaque, brittle, won't wash clothes, *et id omne genus*—which occupied so much space in the object lesson books with which most of us are more or less painfully acquainted. The lesson in progress while I was present was one of a series of four on a broom. In the *first* of the series the broom was drawn in "mass" from the object; in the *second* lesson little sticks representing the parts of the broom were pasted on drawing paper thus:—

In the *third* lesson a freehand drawing of the brush was made, which was "cut out" afterwards, the head of the broom being divided into little strips. In the *fourth* lesson an illustrative exercise in drawing was taken, which included the broom. "Mother sweeping the room" was the title of the illustrative drawing which I saw. All the drawings were made with brown crayon on thick, grayish paper.

I feel sure that many of my readers will agree with me that work of this sort is well worth a trial; but it seems to me that there are a few criticisms which ought not to be left unsaid. The "object" from which the drawing and constructive work were done was a small toy broom about eight inches long, which was, of course, much too small to be seen properly by the whole of the class. And it is open to question whether "mass" drawing is the "natural" precursor or the best precursor to outline freehand drawing. By "natural" precursor I mean, Do children spontaneously adopt this method

when drawing what they like in their own way? And have primitive peoples, who have scratched their crude presentments with bone on the walls of their caves, made mass drawings rather than outline drawings? By my question, "Is it the best precursor?" I mean to ask whether we have any evidence that children taught "mass" drawing are more accurate in reproducing the proportional areas of things than children who begin drawing in outline. I have made a few definite experiments on these points which I hope to continue by-and-by; but for the present I ask the teacher merely to suspend her judgment until definite evidence is produced. Secondly, there was no question, from the results of the exercises themselves, all of which I saw, that the second exercise—the one in which the broom was *made*—was the one which had most keenly aroused the interest of the children and the one which was by far the best done.

I am strongly of opinion that for early work of this kind there is little use in merely delineative drawing. The child has not yet separated, and cannot yet separate (I exclude cases of exceptionally early analytic perception), what he knows from what he sees; he will not draw what he sees (a thing almost inexplicable to his teacher), because he has got all that muddled up (complicated is the scientific psychological word) with what he knows the thing to be like. Nor is he drawing his visual images. (I mention this because it is an error very current in schools and only just being removed from psychological works themselves.) What the child is keen about is the construction and the drawing of the things as they are, so that the drawings can be cut out and put together to make the thing itself. But he has to see what the drawings are there for. The beautiful diagrams, which look like "frills" and "sky-rockets," and which when cut out and stuck together make such delightfully simple and pretty things, are of little use to the child; he does not see how the one thing leads from and to the other. The thing is made, it is true, but it is a miraculous event, a *deus ex machinâ*. From that point of view I strongly favour the presentation of the object first; then, I suggest, let the children analyse it—with the teacher's help, of course, just in so far as that help is absolutely necessary, and not a step further; then let us draw or model, and then let us make. That at least seems to me, so far as the science of educational psychology has gone at present, a more correct sequence than the one adopted in the Manhattan school.

Of course the drawing of the broom as actually observed was bad—the teacher was well aware of that. But she said, "It's not the drawing that matters; it's the development of the child's idea." If by that she meant that the accurate observation of the proportions of the "broom" was a more important matter educationally than a fine dexterity of line in the drawing of it, I should heartily agree with her. But what I think she meant was that their *idea* was what they thought the broom looked like, and that they were rendering that in their drawings. Unfortunately, however, at this stage the children could not separate the appearance of the broom—what the broom looked like—from what they knew it to *be* like, and so they mixed them up in one complicated or confused perception, which, I am sorry to say, is by one school of educational theorists called an "idea" or an "imagination," and so is thought to be a rather excellent thing.

I am afraid that I have wandered a little away from American schools, but I have kept very close to the educational psychology underlying the New Constructive Movement. And I am quite aware—perhaps more aware than most of my readers—how much more careful experimental work needs to be done before we are prepared with a psychology which can really give us detailed practical direction in all our school problems. And I have used the object lesson I heard in the excellent Manhattan school as an object lesson in educational psychology.

One satirical American professor introduced me to his university colleagues as a psychologist who had come to America in order to tell Englishmen afterwards what to avoid educationally. I should certainly not subscribe for a moment to such a description of my own purpose; but perhaps my English readers, when they think I am unduly critical of American work, will put it all down to the suggestion of the American professor. (*To be continued.*)

THE CONSTRUCTIVE MOVEMENT IN ELEMENTARY SCHOOLS.

BY ARTHUR W. BULL.

IN many towns in England a system of manual training for boys has been adopted which provides facilities for a limited number of scholars to gain knowledge and experience in the uses of tools, the properties of the various timbers, and the construction of models. Although this system may be of great value from an educational standpoint, there is too often an entire absence of co-ordination with the ordinary work of the school. In many instances the manual training centres are entirely isolated from the school. The manual instructors frame syllabuses of work which are, no doubt, excellent in themselves, but which show little consideration for any scheme of instruction which may have been drawn up for the same boys by the master of the school. Hence we find such errors as the overlapping of studies and the assumption of standards of efficiency by the manual trainers which are in many cases at fault. The instructor at the woodwork centre has too often to face the problem of suiting his teachings to the various capabilities of boys drawn from three or four different standards.

Again, from the standpoint of an ordinary class master, who probably knows nothing of what is going on at the manual centre, the fact that on certain mornings or afternoons he may lose some twenty or more of his boys is not conducive to a continuity in his work. It must form a break which is detrimental to the efficiency of his class as a whole. Had he, however, some control over the practical work of his boys, he could so arrange that every boy had opportunities for securing manual dexterity, and that the constructive work should be so associated with other subjects that it would be of material assistance to his efforts to educate. Why should education authorities, who admit the educational value of manual work, adopt a scheme which provides practical work for about one-tenth of the boys? If the constructive idea be the right one, why not so arrange that all may participate? Existing schemes seem to give too much prominence to the secondary value of the subject—that of its bearing on the possible future occupations of the scholars. Much more satis-

factory results may be obtained where the manual instructor is a member of the ordinary staff of the school, and where a room has been specially set aside as a workshop. Here the syllabus of work is under the all-controlling eye of the headmaster, who naturally arranges that the instruction in the workshop for various sections of boys is in accordance with their other studies. Then, instead of the constructive exercises checking the continuity of the child's progress, they give material assistance, by establishing a relationship with the ordinary class work.

To the master who wishes to introduce constructive work in his school there is unlimited scope. Omitting for the time being the utilitarian aspect of the scheme, and disregarding the relative values of woodwork, metal-work, clay or cardboard modelling, there still remains some educational advantage in whatever section of practical work he may take up. To cultivate the mind and to develop the powers of observation should be one of the first aims of the master in formulating his syllabus.

In Germany we find that it is possible for a boy to enter an engineering workshop or a chemical or physical laboratory. In Australia, especially in Victoria, the practical work is almost entirely confined to the Sloyd system. A Spanish boy does practical work in connection with his mathematics, making paper models of plane and solid geometrical figures. In our own schools boys may be found constructing *papier maché* contour maps in conjunction with their geography lessons, or cardboard models illustrating Norman and Elizabethan styles of architecture associated with their history lessons. In a similar way gardening and floriculture are taught in conjunction with drawing, nature study, and clay modelling. By thus associating the practical work with the other work of the school, the best interest of education will be served.

Hebart tells us "that the hand has its place of honour, side by side with language, to raise man above the beast." Surely we should not be taking this too literally if in connection with the study of "Hiawatha" the students were allowed to construct models of a canoe, wigwam, bow and arrow, or an Indian headdress. What an indelible impression of the beauties of "The Village Blacksmith" would result from the drawing and construction of an anvil, bellows, forge, or a horse-shoe. And so we might continue through the curriculum. Subjects will be found to lend themselves to the extension of the scope of the teacher in developing the constructive faculty of the scholar.

It would be difficult to formulate a universal scheme considering the diversity of conditions under which schoolmasters work. We cannot all have well-equipped workshops with machinery, wood, and metal; but much valuable work may be done with schemes less ambitious, and with no other materials than paper or cardboard, and penknives or scissors.

I think a phrenologist would tell you that the bump of "constructiveness" was well developed in most children. Tell a child to make something, and you discover a trait in his character hitherto dormant. A redeeming feature may be found in the most troublesome boy in the class, a feature which may possibly have been in a state of stagnation for years. His more or less humdrum life has allowed of the full development of his more evil instincts at the expense of the better ones. Notice the lethargy which is thrown off, and the zeal which is exhibited by the child when left, to some extent, to his own resources in the construction of something, no matter what. Watch the "duffer" of the class weeding, digging, or planting in the school garden. Notice him when moulding out the shapes of flowers or vegetables in plasticine, or considering the most advantageous position for the string in his self-constructed box-kite, and then decide, after all, there is something in the lad, and whether this constructive element shall take its place in the curriculum of your school.

It is not intended to suggest that educational handicraft shall qualify the trained for industrial pursuits, but that it is an essential of education to cultivate the powers of manual dexterity side by side with those of the mind. But it would be well, perhaps, in considering the nature of the scheme of constructive work in the school, to suit it to the locality, and to some extent to the possible future callings, of the scholars.

CONSTRUCTIVE WORK FOR STANDARDS III. AND IV.

Children from 8–9 *and* 9–10.

BY C. T. HUNT.

THE work of the older children should begin to be more definite — more exact measurement and proportion; work from drawings, etc., though the utmost freedom should be allowed them in choice of size of object, colour schemes, and use of object. To this end, while the clay modelling, drawing, and some paper-cutting, begun with the little ones, is continued, a set of cardboard models has been included. The models for both standards are twelve of the simplest given during a course of practical work at Leipsic some years ago to my friend, Mr. R. Toms of Exeter Technical College, to whom I owe much. The exercises are simple steps I have devised which lead up to the models.

Drawing.—Standard III.

The drawings should now precede the making of exercises and models, both of clay and cardboard. They may be used for arithmetical purposes, for many measurements can be taken and problems on them made. With regard to these measurements, it will be well to supply strips of cardboard on which the children can mark inches, half-inches, and quarters on one side, while on the other let them mark larger units, divided into tenths. A satisfactory unit is $2\frac{1}{2}''$, or a decametre, for with these the tenths are easily seen; and quite young boys soon can write 2.4 units, 1.7 units, etc., and so they learn from the beginning the use of units and the symbol dividing wholes from fractions. Whenever drawings are made during the early part of the course, several units should be used.

Paper-Cutting and Cardboard Modelling.

Requisites.—Gummed paper of various colours, thin cardboard or light millboard, cutting knives (the marking knives used in manual training centres do admirably), brass rules with guards, a strong adhesive substance like gloy, brushes, rollers—broomsticks cut into six-inch lengths do well—for laying the gummed paper evenly, and heavy millboards on which the cutting will be done. The first piece of work should be the making of a large envelope in which to keep the drawings, papers, etc.

EXERCISES LEADING UP TO MODEL I.—TABLET.

(*a*) Cut oblongs and squares in paper to size from drawings.

(*b*) Cut strips of cardboard to practise cutting. The strips can be used for measuring by younger boys.

(*c*) Cut oblongs and squares in cardboard.

(*d*) Cut gummed paper—

(i.) Same size as one of the pieces of cardboard chosen from (*c*).

(ii.) Larger by given width all round.

(iii.) Smaller by given width all round.

(*e*) Gum papers to pieces of cardboard.

(*f*) The larger-sized pieces will need to be folded over the edges of the cardboard. First fold over two sides, then fold top and bottom, carrying the corners squarely over to the back. Here the children will see that to make a good job of the back a piece of paper smaller than the board will be necessary. If this be of a colour which harmonises with the colour of the other piece used, a pleasant effect is produced.

Model I.—A tablet suitable for recording a week's marks or for engagement card for mother; a scoring block for class cricket or football matches.

(*a*) Cut a rectangular piece of card 5″ by 3½″.

(*b*) Cut two pieces of gummed paper, one white, 4½″ by 3″, and another 5¾″ by 4¼″, the latter coloured green, brown, red, etc., to the taste of the child.

(*c*) Fix papers to card as in the preceding exercises, gumming on the white paper after the coloured one.

(*d*) Find point 1¾″ from sides and ¼″ from top, and then pierce hole for hanging the card. The children would notice that if the card were often used this hole would soon be broken, resulting in a torn, untidy card. Show this is obviated by the use of an eyelet. (The eyelets can be obtained from bootmakers.)

EXERCISES PRECEDING MODEL II.

(*a*) Exercises in fixing eyelets on pieces of card in positions found by measurement.

(*b*) New methods of making good corners:—

(i.) Cut short pieces of gummed paper of requisite breadth and colour.

(ii.) Gum these across corners, fixing at back.

(iii.) Take two pieces of gummed paper as in Model I., and cut the larger across the corners so that part of the coloured corner of the board is exposed.

(iv.) Exercises in edging with strips of one coloured paper and covering the boards with paper of a harmonising colour could be given.

Model II.—Larger tablet, used as a picture board for photographs, picture postcards, etc., or a notice board. Cardboard cornered or edged. Covered with gummed paper, coloured to taste. Two eyelets made.

The preparatory exercises of the following will suggest themselves from the new elements introduced in each model.

Model III.—An adjustable portfolio. Two tablets connected by straps of linen, leather, etc., fixed to one tablet, and passing through slits in the other.

Model IV.—Cover for books. (With or without ribbon or elastic, under which the book covers can be slipped.) Two tablets connected by band of linen, leather, etc., from top to bottom.

Model V.—Square or rectangular box without lid.

(*a*) Cardboard to size—that is, base + twice height.

(*b*) Draw border on card = height of box.

(*c*) Lining paper fixed to inside.

(*d*) Corners cut out, and base side lines half cut through.

N.B.—This cutting should be done on the outside.

(*e*) Corners and edges bound.

(*f*) Outside of sides covered.

(*g*) Base covered.

Model VI.—Box with lid. As in Model V., one being two thicknesses of material larger each way, or both the same size, and insert in one a strip of cardboard so as to make a rebate on which top half would glide.

CLAY MODELLING.

These children, having had a year's practice in thumb and finger work with the clay, can now start using some mechanical means for levelling the slabs on which they build their models. A simple spade tool will be necessary; the boys can cut them from sticks of firewood. The models should still be of the simplest mouldings, with concave and convex surfaces made by additions. Then the same mouldings with superadded ornament, dentals, egg and tongue, simple foliage, pateras. The ornament to be superadded should be practised during the lesson preceding the making of the finished moulding, and this should be large, but in good proportion. Let the children try for themselves, and then criticise the proportions adopted by them. Examples of good moulding could be measured and drawn.

The children will be in a state to see that one drawing of an object will not give facts enough on which to construct the model. A good exercise is that of giving them a simple outline and telling them to make the model. Some few will try, some will be clever and ask questions, then the whole matter can be settled. Before each exercise the drawing should be done. A beginning can here be made with light and shade.

(*To be continued.*)

SPANNING THE GULF;

OR, KINDERGARTEN INSTRUCTION FOR THE UPPER STANDARDS.

BY H. G. STYLES.

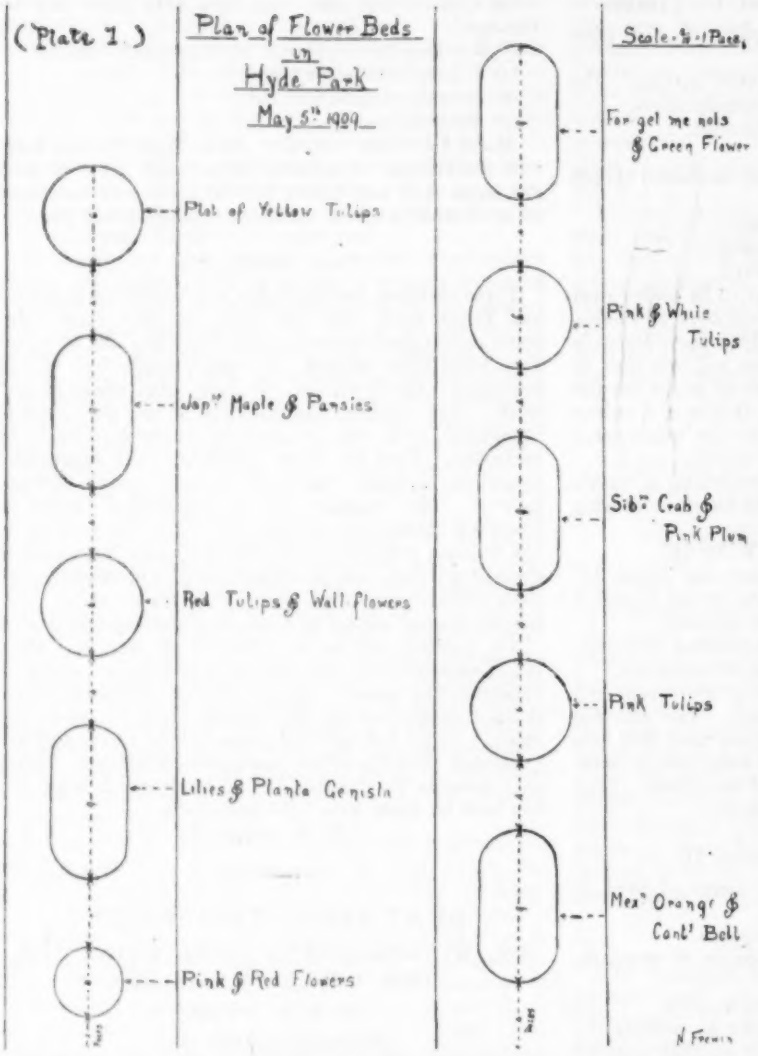
(*Continued from page 127.*)

ALREADY I can hear the reader exclaim, "Well, yes, I would like to try some such scheme as this, but—the time!"

You could never spare the time? Well, of course, if scholarships and high percentages be your only goal, then you cannot venture along the path of the New Constructive Movement. If you must hold like a limpet to your fetish, despising the fads of the faddist—well, I suppose you must. And your epitaph—

> "Here lies one—and this his only fall—
> The reason plain—*he never soared at all.*"

You will have to give H.M. Inspector every assurance that arithmetic, history, geography, composition, English, singing, drill, organised games, and a few other small matters will each receive a full measure of your attention. If your scheme is properly drawn up, however, most of these subjects will find a place, and this is an essential point. Some London teachers, like myself, may find that the only available space is one of the royal parks. (There are not many royal parks in London—I only know of four.) In that case there is another



formality you will have to go through, for you must understand you may not take the altitude of the sun in a royal park without special permission. Accordingly you will apply to H.M. Office of Works for this great privilege. I had to do this, and, in reply, received the following typewritten warrant on the usual blue Government paper :—

A. 6865/07

H.M. Office of Works, etc.,
Storey's Gate, Westminster, S.W.
October 4, 1907.

Sir,—Your letter of the 1st instant to the superintendent of Hyde Park having been submitted to the Board, I am directed by the First Commissioner of His Majesty's Works, etc., to state that they grant permission for the older boys in your school to practise elementary surveying, etc., in Hyde Park and Kensington Gardens under the supervision of their teachers.—Your obedient servant,

W. T. Downes.

Armed with this important document you will set out deeply impressed by the dignity of your office. I well remember the first time I led a squad of twenty lads through the Marble Arch to commence operations along the Park Lane side of Hyde Park. It was a glorious afternoon, and the lads tripped it merrily as if out for a picnic. We eased up about fifty yards from the entrance, and prepared for action, surrounded by a throng of the *élite* of Hyde Park, who no doubt mistook us for a number of German spies about to plan a raid upon the West End. As a matter of fact our object was to measure and draw to scale the flower beds skirting the walk between the Marble Arch and the Wellington Monument. (See Plate I. reproduced from lad's exercise book.) Well, the boys had hardly time to *wet their pencil points*, as schoolboys usually do, when up came Police Constable X99. I was expecting this, of course. In fact, I had done all in my power to attract him from the nursemaid engaging his attention in order that I might publicly proclaim that we were there with special permission from H.M. Office of Works. Without waiting for an introduction, he expressed an opinion that perhaps I was ignorant of the fact that *this* was not allowed unless I had a special permit. My reply was a majestic flourish of the blue paper I possessed. The result was magical. With a grand salute and a "Thank you, sir; you'll excuse me interfering," we were waved forward—a privileged party to experiment under Government authority without further molestation.

I have strayed somewhat from the main subject, but not without purpose. Such incidents as the above are not infrequent, and in alluding to them I desire to emphasise the need for a special form of discipline when engaged in open-air instruction. The discipline of the classroom will not do. At times it would be ridiculous, at others unnecessary. Much freedom is required by the boys, and this means a tactful, resourceful teacher in charge. A very sound disciplinarian might be all at sea under some circumstances likely to be encountered while giving open-air instruction.

I shall now give an outline of the scope of the instruction embodied in the exercises which follow. These will be supplemented by reproductions from the lads' exercise books, with drawings to scale of pieces of apparatus, also the work of the boys. Those who may wish to try these exercises or similar ones will do well in the meantime to prepare for a first lesson. Each lad should be provided with one of the millboards used in London County Council schools for freearm work. Failing this, an ordinary drawing board will answer the purpose. The board must hang from the pupil's shoulder suspended by a thick piece of string which passes through two V-shaped cuts in the board and along the under side. The length of the string is an important matter. If too short or too long, the board will be too high or

too low for work. The proper plan is to let each lad experiment for himself, and then, having obtained the required length, he should store it away for further use.

To go out without this precaution will lead to confusion. *Attention to details* is an essential. (See diagram.)

General Outline showing Scope of Instruction embodied in Exercises.

Pacing; approximating distances; the pole, furlong, square yard, square pole, acre; girth of trees; width and length of paths; shadows, their length and direction; heights of objects from length of shadow; direction from fixed point to surrounding objects by aid of compass; width across water by using 45° triangle; areas of grass plots; plans and diagrams; position and altitude of sun; colour, shape, and motion of clouds; shadows in water; trees, characteristics; shape at distance; leaves; trunk markings, as found in oak, elm, chestnut, maple, sycamore, poplar; charcoal sketching; exercises with compass; reading and use of ordnance maps; historical buildings; monuments; statues, etc.; places of educational interest generally.

AN EDUCATIONAL EXCURSION TO THE ISLE OF WIGHT.

BY E. G. BOWE, GLYN ROAD LONDON COUNTY COUNCIL SCHOOL, HOMERTON.

(*Continued from page 130.*)

THE next matter of interest in this account is undoubtedly the handbook. This consists of seventy-eight pages, showing in turn the names of the party, the aims of the excursion, the things necessary to take, also letters from the headmaster and myself to the boys, followed by many pages showing specimens of plant life in the Isle of Wight, fossils, birds, types of vessels to be seen at Portsmouth *en route*, notes on the geology of the island, on Carisbrooke Castle, Newport, Shanklin, Ventnor, the Roman Villa at Brading, and St. Catherine's Lighthouse, as well as notes on erosion and tides, etc.

The aims of the excursion are set forth in the handbook as follows: "To bring teacher and scholars into closer touch with each other; to foster habits of comradeship, self-reliance, and unselfishness; to develop our powers of observation; to investigate the causes which produce different changes on the sea coast, etc.; to gain fresh knowledge of animal and plant life; to try to spend a holiday intelligently, happily, and to the best advantage; to think of the happiness and enjoyment of the whole party in preference to our own wishes in any matter."

The handbook was compiled by myself, and copies were graphed and given out to the boys to be read and studied before and during the particular fortnight. Among other features of the book may be mentioned the hymn for grace and evening hymn, forming a prayer for God's protection during the visit; the railway journey, containing notes of places of interest passed through in the train; notes on the history of the island; a town plan of Shanklin (our centre); sketches of the flowers, fruit, and insects of the Isle of Wight; contour elevations; notes on chalk and greensands; with a geological map of the island.

At the end of the handbook is a page headed "Teacher's Report," with spaces for name and marks for conduct, cleanliness, observation, and obedience, with teacher's and parent's signatures, to be filled up after the return to school.

Now, to get a good idea of the actual work done whilst in the Isle of Wight, I think I can say that, with very few exceptions, the whole programme was gone through, although, should I repeat the experiment another year, with the previous experiences of 1909 I think that it would be an improvement not to have quite such an extended programme.

The boys were each provided with school-bags containing an ordnance map of the island, a notebook for rough notes, and a small sketching-block; whilst at home they each had a nature exercise-book, into which were written accounts of different excursions, with each boy's own observations gathered during the previous day.

I should very much have liked to reproduce one of the boy's accounts in this particular book, but the space allotted me will not allow of its inclusion.

I must not forget to mention that previous to the day of departure the boys were medically examined and passed "fit," and several were given an exertion test also; and on the first day of their return to school they were each medically re-examined to show what effect the holiday had had on their general health, pulse, and respiration.

There are several details still unmentioned that added greatly to the general success of the work, and amongst these I must mention the free use of three public lavatories in Shanklin; special travelling terms on the Isle of Wight Railway; reduced rates for admission to such places as the Roman Villa at Brading, Carisbrooke Castle, St. Catherine's Lighthouse, etc.—all of which were freely granted after an application made by myself in writing.

Another important matter was, we were most fortunate in securing a large and convenient house of abode and a most capable landlady, who threw her heart and soul into everything she did, and made every one happy and comfortable.

I will now give a few particulars of what was attempted on certain days during the fortnight, in order to show what was considered a good day's work.

On Monday, July 5, the boys were called at 6 a.m., and the majority paraded for bathing.

After breakfast (8 a.m.) the train was taken to Sandown. On our arrival there, the boys were marched from the station through the town to the beach. After walking some distance along the promenade, a halt was made on the sands, where an open-air lesson was given

by me on the topography of the Isle of Wight, and the ordnance maps were studied.

The walk was then continued to Culver Cliff—a chalk formation forming the eastern end of Sandown Bay.

On the way we passed a coastguard station, which was noted; a military fort, which was explained; a Territorial (Hants) camp, which interested all; and on the top of the cliff a Marconi station. Several other things of interest were pointed out to the boys as they tramped along, and numerous questions were asked. The boys returned to Shanklin by train (1.46 p.m.).

After dinner (2 o'clock) the boys had three-quarters of an hour's rest on the lawn at the back of the house.

At 3.15 p.m. a move was made to the beach, where the time was spent in paddling and searching for sea-life—worm-casts and worms, small crabs, jellyfish, and starfish—and in collecting different specimens of seaweed, etc.

After tea (5 o'clock) a cricket match was played, Section B beating Section A by six runs.

Boys returned home at 8.45, and after supper all retired to bed (9.15 p.m.).

On another day (see programme) the boys visited Newport and Carisbrooke Castle. On this particular day Mr. R. S. Stevelly, H.M. Inspector for Hackney, accompanied the party. He had come down specially to spend two days with us and to report to the Department on the work generally.

On arriving at Newport by train, the boys were at once paraded and marched to Carisbrooke Castle (about 1½ miles). Before going into the castle a rest was taken on a grassy slope near the outer gateway, and there a lesson was given on the castle and its historic associations.

Soon the boys were admitted into the castle grounds, and a tour was made, the teacher acting as guide.

Among the several things noted were the ruins and position for a fortress; the site of a Roman camp; traces of British, Norman, and Elizabethan work; the outer gateway, the moat, the gatehouse, the armoury and keep, also the room where Charles the First was imprisoned, and from which he tried to escape.

After lunch in the open air and an hour's rest, the boys walked back to Newport, where a lesson was given on the local history. Among the several places noted and visited may be mentioned the Parish Church with its pulpit and tomb of Princess Elizabeth, daughter of Charles the First; the market-place, Town Hall, and Queen Victoria Memorial in High Street; and the Colonel Seeley Library and Reading Room, where a rest was much appreciated.

At 3.50 the return journey by train was commenced, and Shanklin was reached at 5.6 p.m.

In the evening the boys were free, had supper at 9 p.m., and retired at 9.30.

Another delightful excursion was the visit to Whitecliff Bay, where the boys had the advantage of the presence of Mr. J. Milman Brown, a member of the Education Authority, whose knowledge of the geology and flora of the island is so well known.

The party was accommodated in three wagonettes, supplied at reduced rates, and a halt was made near the Granite Fort at Sandown, where Mr. Brown told the boys about the landing of the French in the early part of the fifteenth century.

Another halt was made at Yaverland, and by the kindness of Mr. Warder the lads had the additional advantage of looking over the ancient Manor House. A little farther on, reference was made to the scene of Caedwalla's battles, and then the journey was continued as far as the carriages could go.

The walk to the shore was much enjoyed, and when there Mr. Brown imparted a good deal of information concerning the various strata. Search was eagerly made for fossils, and many good specimens were found and carried carefully home.

On arriving in Shanklin, tea was partaken of on the sands near Small Hope, this treat bringing to a close a most happy and instructive day.

Hunting for Fossils in Whitecliff Bay.

Every day seemed full of fresh interest to the boys, and want of space alone prevents me from giving in detail full accounts of all.

Another most interesting and enjoyable day was the visit to St. Catherine's Lighthouse on Friday, July 9.

The party left Shanklin by the 8.34 a.m. train to Ventnor, which was reached at 8.48 a.m.

The boys paraded on the platform, and marched along the St. Lawrence Road to Steephill Cove, where they enjoyed a bathe or paddle.

The whole morning was spent in the cove, and the many objects of interest at hand made the time slip by only too quickly. At 12.15 lunch was served round on the sands, and after half an hour's rest the walk was continued along the edge of the cliff to St. Catherine's Point, on which the lighthouse stands.

The boys entered the lighthouse, and were much interested in what they saw and heard.

They were told that the intensity of the light was no less than 15,000,000 candle-power, the light being visible in clear weather even from the French coast. A flash of one-fifth of a second is given every five seconds, and in addition a fixed red light is always shown along the back of the island as far as the Needles.

The whole of the revolving part floats in a trough of mercury, 816 pounds being required to float it.

The light is an electric one, and the carbons are renewed every three hours. The engine-room contains three engines and boilers. Two generate the electric light, and the third is employed to compress air for the siren or fog-horn by which vessels are warned in misty weather. This siren gives two successive blasts every minute, and inside the lighthouse an ingenious instrument records every blast.

The boys returned by the main road to Ventnor, all highly delighted with the outing. Shanklin was reached at 5.45 p.m.

I would like to add, in conclusion, that during the whole fortnight a log-book was kept by the teacher, into which was entered from day to day a rough account of the previous day, with particulars of times of rising and retiring, the state of the weather and how it affected the arranged programme, the temperature of the bedrooms, and the conduct of the party as a whole; and I may say that since our return I have found it very useful for reference in drawing up any statement required of the work done by the boys in the Isle of Wight.

THE LATE MR. W. F. STANLEY.

BY the recent decease of Mr. W. F. Stanley the country has lost one of its keenest educationists and one of its most interesting personalities. Being the founder of the firm of W. F. Stanley and Co., Ltd., opticians and mathematical instrument makers, he was in close touch with the commercial activity and competition of the world. The difficulty he experienced in securing for his workshops skilled mechanics who could compete with their foreign *confrères* led him to strike at the root of the evil—the education of the boys. He often declared that his life's dream was to institute a system of education which would give boys a practical taste for mechanics, and so make them of use in a workshop when they left school.

He was a member, and for some years the chairman, of the Croydon School Board, where he displayed the keenest interest in elementary schools. Afterwards, he was instrumental in organising and acting as chairman of the South Norwood Polytechnic, an institution which was most successful under his presiding influence. One of the most disappointing blows, and one which he felt most severely, was the disbanding of his Polytechnic Committee by the workings of the new Education Act.

He now set himself the task of providing for the intellectual improvement of both the juvenile and the adult population of South Norwood. For this purpose he built an institution, known as the "Stanley Halls," at a cost of over £80,000. This institution is now the centre of educational and intellectual activity in the neighbourhood. The building itself is of great beauty. Mr. Stanley was his own architect, and he spared no pains or expense in designing a block of buildings which would do credit to his name for all time.

In addition to the technical and trade school, mentioned in our last issue, there are concert-halls and assembly-rooms, to meet the requirements of the tastes of all who may desire to use them.

One may enjoy the intellectual treat of an evening at the Stanley Athenæum, or the artistic treat of a visit to the Stanley Art Gallery; while those with histrionic or musical tastes are equally well catered for. With the exception of the Technical School, which has been amply endowed, the whole building has been handed over to the Charity Commissioners, and is ably managed by a board of directors.

Mr. Stanley was a man of many parts, and versatile in the extreme. From his pen we have works on the nebular theory, fluids, and mathematical and drawing instruments. His imagination has given us *Utopia*, and a few poems and plays. He was a painter, sculptor, and woodcarver of no mean ability. He was an authority on subjects as far removed from each other as Buddhism, astronomy, gardening, and zoology. As a member of the British Association he travelled to South Africa, and his business and educational interests have caused him to visit many countries.

Mr. Stanley's career was characterised by prodigious industry. His own business was largely built up by his ingenuity and indomitability in securing materials and appliances for keeping abreast of the times. His steadfastness of purpose and alert and unerring judgment were instrumental in securing that success which suggested to him the motto of his crest—the words "*Sans changer*."

SEASONAL LESSONS IN NATURE STUDY.

BY THE REV. ALFRED THORNLEY, M.A., F.L.S., F.E.S., SUPERINTENDENT OF NATURE STUDY TO THE NOTTINGHAMSHIRE AND LEICESTERSHIRE COUNTY COUNCILS.

THE LEAF.

THE first part of this lesson can be taken with all standards, the second part with the higher standards.

PART I.

The Shape and Structure of Leaves.—The leaf is the characteristic organ of the stem. Underground stems (rhizomes) can be distinguished from roots by the presence of scaly leaves upon them. A good illustration is garden mint. A typical leaf—for example, apple—consists of a flat expanded portion (the *blade*) and a stalk (the *petiole*). When the petiole is missing, the leaf is said to be *sessile*. A great many leaves, however, possess a pair of singular organs (permanent in such leaves as the rose; transitory in many others, as in apple and plum)—the *stipules*. These can be well studied in most leguminous plants—for example, garden pea. Sometimes the petiole is expanded into a sheath, as in cow parsnip (*Heracleum*) and in all grasses. The portion of the stem from which a leaf springs is called a *node*. The interval between any two nodes is called an *internode*. The leaf arrangement follows the bud arrangement (see lesson on "Winter Buds"), as the leaf is developed from a bud.

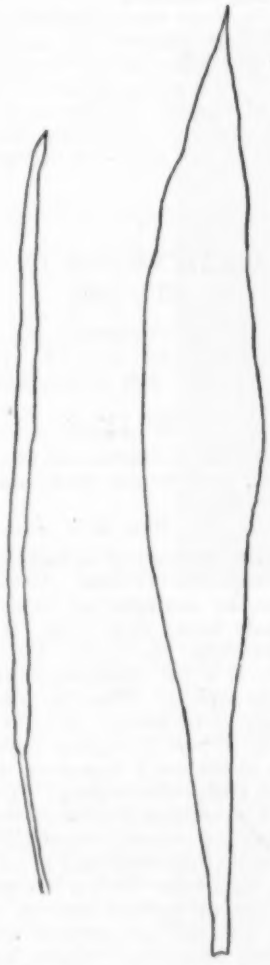
The Blade.—The following five points are worthy of study: (1) Venation, (2) Outline, (3) Margin, (4) Apex, (5) Character of the Surface.

1. *Venation.*—Its origin. The conducting strands from the stem pass into the leaves, forming the veins.

There are two main types of venation: (*a*) ***Parallel venation***—for example, grass, onion, hyacinth, and most monocotyledons; (*b*) ***reticulate (netted) venation***—a few main strands and a great many smaller ones running into one another.

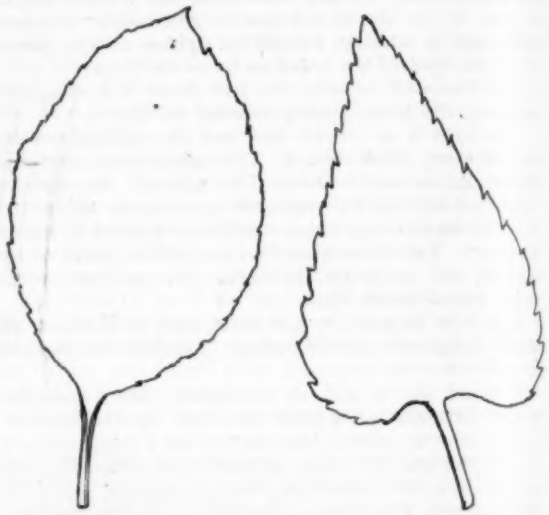
The net-veined leaves (reticulate) can at once be divided up into two well-marked groups: (1) Pinnately or feather-veined, sometimes termed ***unicostate***, in which there is one main vein from which the others diverge—for example, apple, elm, etc.; (2) Palmately, sometimes called ***multicostate***, in which there are several main veins, each of which gives rise to numerous smaller ones—for example, ivy, sycamore.

2. *Outline.*—Leaves vary in outline almost from a straight line (pine-needle) to a circle (tropæolum). The following are the chief shapes, but some leaves will be intermediate in shape between these forms, when two designations will have to be used—for example, lanceolate-cordate: (1) Linear—grasses, pine-needles; (2) lanceolate—narrow-leaved plantain; (3) elliptical—



Leaf 1. Leaf 2.

privet; (4) ovate (egg-shaped)—apple; (5) cordate (heart-shaped) — woundwort; (6) sagittate (arrow-shaped)—arrowhead, arum; (7) hastate (dagger-shaped)—spinach; (8) reniform (kidney-shaped)—ground ivy; (9) spathulate (spoon-shaped)—daisy, London pride; (10) orbicular—tropæolum, pennywort.



Leaf 4. Leaf 5.

3. *Margin.*—The margin may be either entire (lilac) or toothed. When the sides of the teeth are approximately equal, it is ***dentate;*** when one side of the tooth is longer than the other, it is ***serrate***—for example, laurel; and when the teeth are rounded, it is ***crenate*** (ground ivy).

4. *Apex.*—Acute—when the apex is pointed; obtuse—when it is blunt; emarginate—when it is notched (clover); mucronate—when the midrib is continued into a little point (medick).

5. *Surface.*—Whether smooth (glabrous) or hairy, on one side or on both. Older children may be taught to notice how the leaves are arranged in the bud (æstivation), or how each leaf is itself folded in bud (vernation).

Modifications of Leaves.

(*a*) *Cotyledons.*—Note difference from foliage leaves—for example, sycamore—their uses as storehouses of food, their number, their functions. (See lesson on "Germination.")

(*b*) ***The Bud Scales*** may be portions of leaves or whole leaves. Function, as protective agents and storehouses of food; and are associated with perennial plants.

(*c*) ***Bracts and Bracteoles.***—These are modified leaves found on flowering axes and on the stalks of flowers. They are often very similar to green leaves, but sometimes are very brightly coloured, as in poinsettias and bougainvilleas and many of the cow wheats (*Melampyrum*).

(*d*) ***The Floral Leaves.***—Sepals, petals, etc. (See special lesson on the flower, to follow.)

(*e*) ***Leaf Spines.***—As in barberry, where every gradation between leaves and spines may be seen.

(*f*) ***Phyllodes.***—These are leaf petioles greatly developed at the expense of the blade—for example, cow parsnip and acacia.

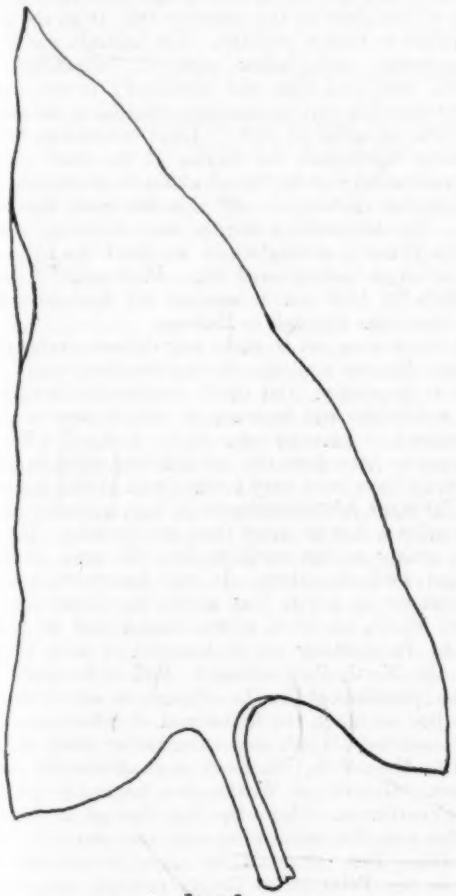
(*g*) ***Leaf Tendrils.***—These are the threadlike structures seen in many vetches and peas. They are exceedingly irritable organs, and wind round any small object in reach.

Note.—Not all tendrils are modified leaves; some are modified branches—for example, vine and bryony.

Simple and Compound Leaves.

A rose leaf is considered a compound leaf for the following reasons :—

1. Though it consists of a number of separate leaflets, there is only one pair of stipules to each compound leaf.



Leaf 6.

2. Buds are not found in the axils between each leaflet and the main axis.

3. The structure terminates in a leaflet and not in a bud.

4. It falls as a whole.

For these reasons (and also others) it is agreed to look upon leaves such as those of rose and ash as compound leaves, and not as an axis bearing a number of separate leaves such as a twig of elm.

Leaves with a number of separate leaflets—as in rose, ash, and vetches—are termed *pinnate*, and each leaflet may be termed a *pinna*. Very frequently each *pinna* may itself be composed of smaller leaflets, and the leaf is then said to be *bi-pinnate*. Even *tri-pinnate* leaves are known. The *Umbelliferæ* will illustrate these points.

Leaves without separate leaflets, but with deep indentations—for example, oak—are "simple" leaves, and the term *pinnatifid* is usually employed to denote such. These indentations do not reach the midrib.

Children should be encouraged to make collections of leaves, which should not be placed in books or on paper until they are thoroughly dry. Then they can be fixed with little narrow bands of sticky paper, one

Leaf 7.

over the stalk and one just over the apex, or in any other convenient position.

They should be arranged in some definite order, to show either (*a*) variation in shape, from linear to orbicular; (*b*) simple and compound leaves; (*c*) the variation of leaves on the same plant—for example, ivy or snowberry; (*d*) venation—parallel and reticulate veined, pinnately and palmately; (*e*) modifications—stipules, bud scales, etc.

This is much more educative than indiscriminate collections of leaves.

Leaf Mosaic.

The arrangement of leaves with respect to the incidence of light is a good subject for nature study. The advantage of the decussate arrangement (see lesson on "Winter Buds") may be discussed, and also the various devices to bring leaves into the best situations for receiving light. Maple and sycamore are a beautiful

Leaf 8.

Leaf 9.

study in this respect. Older children should make drawings of leafy twigs of those trees, showing the position of the leaves with respect to the light, or sketch a small portion of a hedge-bank covered with ivy. The relative sizes of leaves grown in shade and in plentiful light should be observed. The leaves of many biennial

herbs (thistles, etc.), which remain green during the winter, usually exhibit a characteristic rosette form.

Evergreens.

The thick skins (cuticles) of these leaves should be noted, and the fact pointed out that the leaves do fall, but not all together at one season, as in the case of deciduous trees.

Leaf-Fall.

Though it is impossible to make clear to children the reason of leaves falling in autumn, the mechanism of the fall may be simply explained to them, and the

Leaf 10.

wounds (leaf-scars) examined on the twigs. With older standards a good slide showing the abscis layer of cork may be exhibited under the microscope. The children might make out a table of leaf-fall, with dates showing the earliest and latest trees to shed their leaves, also the colours the dying leaves assume.

(*To be continued.*)

GEOGRAPHY NOTES UP-TO-DATE.

BY E. R. WETHEY, M.A., F.R.G.S.

Cook's North Pole.*

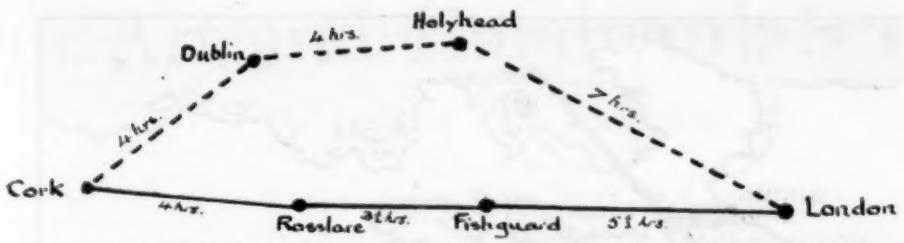
WITH regard to the latest Polar sensation, all, at the time of writing, is conjecture. But it is well to mark at once the initial stages of what may prove the climax of Arctic exploration—at least, as far as the attainment of the highest latitude is concerned. Just at a time when all eyes were turned south, when Lieutenant Shackleton and his achievements were ringing in the ears of the Western world, there suddenly appeared a quiet American who gravely announced by telegram that he had discovered the North Pole! Briefly, events shaped thus: Dr. F. A. Cook, who had served with Peary in 1891, with the Belgian Arctic Expedition of 1897–98, and had led an exploration party to Mount M'Kinley in Alaska in 1903, arrived at Annootok (twenty miles north of Etah, Peary's headquarters in North-west Greenland) in the autumn of 1907, with intent to reach the Pole if he could. Finding circumstances favourable, Eskimos enthusiastic, and dogs ready, he decided to make the attempt at once. Leaving Smith Sound, he worked west to Axel Heilberg, the big island immediately west of Ellesmere Land and Grinnell Land. Thence, with two men and twenty-six dogs, he made his dash more or less up long. 94° W., and was successful. His own words, as first quoted in the newspapers, complete the picture: "The day was April 21, 1908. The sun indicated local noon, but time was a negative problem, for here all meridians meet. With a step it was possible to go from one part of the globe to the opposite side, from the hour of midnight to that of midday. The latitude was 90°, the temperature –38° below zero C., barometer 29·83. North, east, and west had vanished; it was south in every direction, but the compass pointing to the magnetic pole was as useful as ever." Later corrections from the explorer disclaimed the finding of the *exact* spot, but he maintained that he was all about it, at anyrate within a "gunshot distance." All this was more than a year ago. The intervening months were taken up with the return journey, during which he spent the long Arctic winter in an underground den. He reached Upernivik on May 21, 1909, but it was not till September 1 that his news came through to Europe.

It is too soon yet to make any definite statements as to this famous exploit. It was received with a good deal of scepticism, and much remains to be told when the notebooks and instruments which were sent from Greenland to America come to be examined. Dr. Cook appears to have done the last hundred miles in a week. He must have been very fortunate in hitting on smooth ice, for most Arctic explorers in high latitudes consider five miles a day as more than satisfactory. He found land nearly as far north as lat. 85°, and, above all, he got back in safety. It was known that he was somewhere up north, but as his last letter had been dated March 17, 1908, it was feared that he had perished. Incidentally one is tempted to ask, To whom will the North Pole belong? Will it be painted *red* as the hinterland of Canada—though, on second thoughts, it is just as much the hinterland of Siberia—or will it be considered Danish as a culminating point of Greenland? Meanwhile, Dr. Cook is an American, and the Attorney-General at Washington holds the view that the Constitution follows the flag, though he fears that in this case the acquisition will not prove to be very valuable. But, after all, as there is no land there, and as the Polar ice is always moving, one might as well attempt to annex an iceberg!

* Peary's Pole will be reviewed next month.—Ed.

The Advance of Fishguard.

When the Great Western Railway on August 30, 1906, established a new Irish service *via* Fishguard and Rosslare, something was bound to follow. Some three or four millions sterling had been spent in bringing Goodwick Harbour (a little to the west of the small market town of Fishguard) up to modern requirements. It was not a new idea. A hundred years ago Brunel had seen the capabilities of the small Pembroke town, but the cliffs on the west entailed too much work or too much expense for the engineers of that time, and Milford Haven was chosen instead. Ten years ago the old project once more came to the fore. By 1906 the cliffs were blasted, a breakwater was built, quays were erected, and a minimum depth of 20 feet—since increased to 30 feet—at low water was guaranteed at quayside. The competition for the American mails had entered on an acute stage. Fishguard is fifty miles nearer New York than either Plymouth or Holyhead, and in the same race it beats Liverpool and Southampton by no less than 115 and 175 miles respectively. For years the Great Western Railway had noted the



THE RIVAL ROUTES, CORK TO LONDON, ON THE OPENING OF THE COMPETITION, 1906.
– – – – – L. & N.W.R., 15 hours. ——— G.W.R., 13 hours.

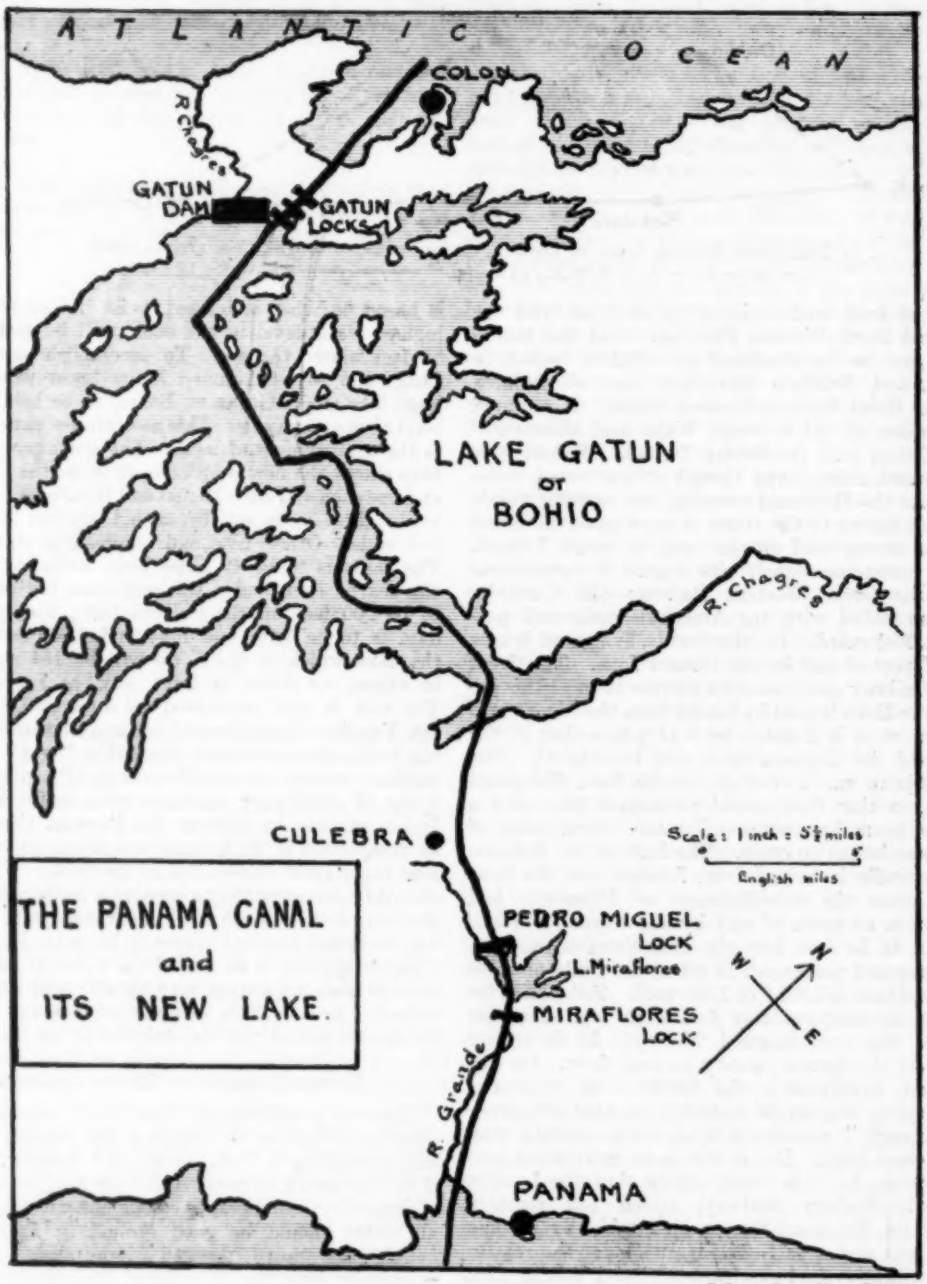
monopoly of Irish trade enjoyed by its great rival the London and North-Western Railway. And this monopoly was not to be wondered at. Dublin looked to Holyhead, and Dublin's hinterland was all Ireland. Quietly the Great Western Railway began. It acquired the main lines of rail in South Wales and Monmouthshire, and then built the Severn Tunnel. Without this the Fishguard route, even though it was seven miles shorter than the Holyhead crossing, was nothing worth. The establishment of the route at once gave the Great Western a strong hold on the trade of South Ireland. And now comes the sequel. On August 30—auspicious day for the Great Western Railway—the Cunarder *Mauretania* called with the American mails and passengers at Fishguard. In other words, Fishguard is now an official port of call for the Cunard Line. The Great Western Railway accelerated its service to meet this development. Mails landed by tender from the *Mauretania* at 2.7 p.m. were in London by 6.41 p.m.—that is, the 5¼ hours of the diagram have now become 4¼. The next step is to run a through service from Fishguard to Dover, so that Continental passengers may save a few more hours by omitting London. Something of the sort was bound to come. The bulk of the Atlantic passenger traffic is to and from London and the Continent; hence the establishment of Plymouth and Southampton as ports of call by the Cunard's rivals. It remains to be seen how the undoubted advantages which Fishguard possesses will affect the trade of these ports, and, above all, that of Liverpool. Fishguard, for one thing, is comparatively free from fog. Contrast this with the siren-haunted Mersey! It is nearer America, as the figures already quoted show. On the other hand, Liverpool is the depôt of an enormous manufacturing commercial industry, so that all else—save "through" passengers and mails—should stay with the older town. But it will be an interesting contest to watch, for it is hardly likely that the London and North-Western Railway, which has recently shortened its Holyhead-Euston time-table by no less than an hour and a half—or Liverpool, for the matter of that—will take the loss of prestige lying down. Nor does the fact that Plymouth, Southampton, and Dover are all in the game lessen the interest.

THE PANAMA CANAL UP-TO-DATE.

No one who cares to know the greater things which are shaping the world can now afford to be ignorant of what is happening on the Isthmus of Panama. So says Dr. Vaughan Cornish in his new book on the canal. Events of 1908 have put out of date some parts of the article on this subject in *The Practical Teacher* of January 1908. It is as well, then, to supply a new sketch map and a correction—until the next change of plans occurs. The American plan finally perfected in 1908 is based on what is termed "the 85-foot level." The highest water-level in the canal will be maintained at 85 feet above the sea. To accomplish this the river Chagres is to be dammed in its lower waters, and a huge lake (Lake Gatun or Bohio) to be held up to this level above mean tide. This necessitates various changes in the arrangement of locks. The accompanying sketch map shows the new positions—three at the Gatun dam, and one each at Pedro Miguel and Miraflores. Enormous works these locks will be, each 1,000 feet long and 110 feet wide. Other new and interesting statistics are: The canal is to be 49 miles long, including 4 miles in the sea at each end; the minimum bottom width is to be 200 feet, in the Culebra Cut; the great Gatun dam is to be 7,700 feet long and 2,060 feet wide, and the lake which it holds up will be 164 square miles in extent, or twice as large, say, as Lago Maggiore. The cost is still estimated at some £30,000,000 *odd*. Dr. Vaughan Cornish—and other authorities are agreeing with him—considers that this "odd" will mean another twenty, or £50,000,000 in all, with the possibility of eventually reaching even a far larger sum. If his surmise be correct, the Panama Canal will, on its completion in 1915, have cost about as much as the nine other great ship-canals in the world. That the cost should be comparatively excessive is really not surprising. Not only is there much more excavation work to be done, but there are tropical rivers to be controlled; and the Chagres appears to be one of the worst of its class. To convert such an enemy into an ally will be a triumph indeed. As it is, this brilliant scheme will depend for its success entirely on the stability of the Gatun dam.

IS THE CLIMATE OF EGYPT CHANGING?

There is a widespread belief that increased and increasing irrigation is changing the climate of Egypt, and is making it both colder and damper. Certainly if the formation of great reservoirs and the distribution of water by innumerable canals can alter a climate at all, there should be good ground in Egypt for this belief. The huge Aswan dam alone (1898–1902) practically converted 50 miles of the Nile into a reservoir for part of the year. Within the last twenty years such works as the completion of the Delta barrage (twelve miles north of Cairo), the Assiut barrage in middle Egypt, the Zifta barrage on the Damietta branch, and the recent works at Esna have added enormously to the water area available for perennial irrigation. And yet investigation shows that all this work of man has had little, if any, effect on the phenomena of Nature. The records of the last forty years, according to Mr. B. F. E. Keeling of the Egyptian Ordnance Survey Department, show that neither rainfall nor temperature has undergone any change. The mean annual temperature of Cairo is, and has always been during the



period under observation, just under 70° F., and the rainfall an inch and a quarter. At Alexandria the proximity of the Mediterranean and its rainstorms account for an 8-inch rainfall. Farther up the river the fall drops to nil. Things, therefore, are much as they have ever been. There was rain in Napoleon's time at Cairo, so what falls nowadays can hardly be ascribed either to the Suez Canal or the irrigation works. Incidentally, even if the temperature of the country were undergoing a slight cooling *régime* and the rainfall increasing to the amount of a few inches a year, and even if, in consequence of such untoward results, the flowing stream of tourists were interrupted a little, the agricultural benefits which have accrued to Egypt from the works of its famous engineers would provide ample compensation. In the very first year of the completion of the Asswan dam the cotton crop was saved from a "poor Nile," and the value of that crop was summed up as £22,000,000. Within five years the sale value of lands irrigated by the same dam had increased by £24,000,000. Irrigation works are very old in Egypt, and they will not be finished until, as Sir William Garstin believes, the entire remaining area of Egypt now under "basin" cultivation will be "perennially" irrigated. There may be, therefore, still time for the pessimists to become true prophets.

Our Art and Handwork Section.

PAINTERS AND PICTURES.

BY W. E. SPARKES.

XIII.—J. L. E. MEISSONIER. XIV.—A. C. GOW, R.A.

Meissonier, Painter in Little.

QUALITY, and not quantity, counts in art; merit is not to be measured by the cloth-yard. For consider the artistic value of many small things: Japanese carvings wrought in bone, ivory, or hard wood—living and fantastic creations cut by common artisans, and yet instinct with artistic feeling; statuettes from Greece, sometimes original, sometimes copies of fine marble statues; Italian medals and Greek coins, simply and strongly modelled in a large style; figurines from Rome, worth more than their weight in gold, not so much for their rarity as for their accomplished art; illustrations to the sacred stories or to missals, drawn with loving care by monks in their cells; miniatures by Hans Holbein or Isaac Oliver, finer than many life-sized portraits.

And not only form, but colour too, may be fine in small things. There are eighteenth-century woodcuts from Japan that are a liberal education in colour harmony; the glazes on some Chinese bowls are as soft and tender as a dove's throat; and for stronger harmonies, you may look far before finding richer combinations than glow among the metallic decorations of an old Persian tile.

Yet mere mass has its value, impressing the mind more strongly than delicacy and skill. The rough block from the marble quarry has some qualities denied to the statue it encloses; the mountain is more impressive than the many-towered city at its foot.

But when consummate skill in design is combined with vastness, as in Giotto's tower or in Michael Angelo's frescoes for the Sistine Chapel covering the walls and invading the vaulted roof, the mind contemplates these with an added delight differing greatly from the intimate pleasure it finds in small and perfect works of art.

"The Wayside Halt." (J. L. E. Meissonier.)

Michael Angelo and Meissonier have a likeness and a difference. Even in his drawings and little wax models for sculpture the great Italian worked with an eye to large spaces, elaborating nothing, but leaving all in simple breadth; whereas Meissonier pays heed to the most minute particular, without, it is true, descending altogether to the trivial—a fact which, as we shall see, separates him sharply from others of the minute school.

Michael Angelo, if he had had the strength, would have carved statues out of rocks; Meissonier, if born a hundred and fifty years ago, would have chosen to carve a Japanese button. One was a turbulent spirit, the other a placid, luxurious painter, who produced works so small that on their first appearance they were dismissed by a celebrated French critic contemptuously as "ornaments for snuff-boxes."

Yet such is the excellence of these tiny paintings, often covering only "a space where two fighting cockchafers would be ill at ease," that their author stands high among modern painters, and lived to see a "Meissonier" a possession for which princely collectors outbid each other in the saleroom.

He reached this Lilliputian style only by degrees. In his young and hungry days, in company with Daubigny (another artist destined to make a great name), he painted masterpieces at five francs a yard—"pot-boilers" sent out by the score to delight South American grandees posing as men of taste.

Meissonier, however, soon found an outlet for his skill in quite another direction. Turning abruptly from these heroic canvasses, he began to decorate fans, missals, and Scripture cards; and when he had become famous among the frivolous and the devout for his delicate handling, he found other avenues open to him in those tiny book-illustrations so much in favour just then among the French public. From such drawings on wood it was an easy step to painting tiny scenes on canvas. Already in his outline drawings (especially to a humorous series of poems) artists had recognised an accomplished draughtsman with a power of dramatic composition and a knowledge of character quite beyond the ordinary. Now in his paintings there stood revealed the strong colourist who sacrificed nothing in reducing his paintings to the dimensions of a card-case.

Not that he was the first to paint in this *tabatière* manner. The patient Dutchmen he had studied so ardently in the Louvre during his apprenticeship had carried the art sometimes to a painful excess. Think of the seventeenth-century Gerard Dou deliberately devoting a fortnight to painting a broom, and seeking applause for rendering every minute roughness in the skin of a plucked goose, though in accomplishing so much in so little he maintained a breadth which is his chief excellence. The men who followed him, painting, as they did, wooded landscapes and *fêtes galantes* on snuff-boxes, had little in common with their master except excessive care. Their works were mere toys, to be classed with Chinese carvings in which twenty mandarins take tea in an ivory garden no larger than a walnut shell.

For though a man handicaps himself severely by painting in this Lilliputian manner, he may succeed in lifting these rather contemptible exercises for ingenuity and patience into the atmosphere proper to great art; he may maintain exact drawing, just composition, harmonious colour, and, above all, a *breadth* commonly to be found in large paintings, striking examples of which are the miniatures by the best British miniaturists. These men escaped hardness in their tiny portraits by using large brushes; and though a casual glance distinguishes nothing in their work from the painful Dutch painters in little, a closer inspection shows them obtaining their results by a few well-placed, broad strokes.

The crucial tests are the magnifying-glass and the enlarged photograph. If painted in the dry pre-Raphaelite manner, the painting is seen to be scored by multitudinous thin lines, most disagreeable when revealed in their mechanical dryness; whereas the bolder paintings are fresh and broad—a few colours admirably graded, and able to stand enlargement to a high degree. You could not tell from an enlarged photograph whether these tiny paintings cover square feet or square inches; they all (as you may see from the present picture, "The Wayside Halt") have a largeness in appearance that completely conceals their confined handling, so that you would say, Here is a print from a large painting.

This justifies Meissonier in his method. The "snuff-box" painting with this excellence belongs to the schools which include Raphael and Whistler alike; neither tradition nor experiment is opposed to such painting in small; the essentials—fine drawing expressed or suggested, breadth, and atmosphere—may be as well comprehended in a square inch by a man with keen sight and sure hand as on a chapel wall or in a tapestry for a pope's reception room.

Atmosphere? Yes, here it must be confessed that the latest criticism begins to boggle at Meissonier's art. "We grant you all artistic excellences in his paintings save *that*," say the modern critics, "but that is a fatal omission."

Skilful as he was, deeply versed in artistic methods, his pictures are apt to glare as though under Eastern skies with bright sunlight, the air dry and transparent, and without those soft veils that spread through the distance under our more humid sky. He will paint you a "Wayside Halt," but the buildings and the figures in the distance are too insistent; they are not "placed" well; they have not their proper "value;" the bricks in the wall and the buttons on the men's coats are as plainly seen as if they were close at hand.

There is a measure of truth in this, but only a measure. What of his astonishing "1812," with its crowded regiments seen less strongly through the mist that spreads like a pall over the doomed army? And though less evident in pictures where the action takes place in the foreground, the atmosphere is not altogether wanting.

Another more serious objection to Meissonier's work is the apparent absence of imagination. Does he *create?* Is he much more than a perfect human camera, a sensitive plate devoid of originality? What strongly felt and strongly expressed emotion is there in such pictures as "The Wayside Halt"?

"The Wayside Halt."

Meissonier had no message to deliver. He selected moving moments or not, as the whim took him, but he looked for an artistic result quite apart from the subject. He had no sympathy with the schools that would use art as a vehicle for teaching ethics or religion—a position taken up by most artists in these latest days. They aim at what Mr. George Clausen aptly calls a "pattern," woven from forms and colours interplaying with light and shade as the threads that make up the design. The artist asks, "How does the picture *look?*"

and not "What does it *teach?*" Meaning and teaching may well enter without reproach, but the most pretentious and portentous preaching shall not excuse work that is inartistic, insincerely felt, or without knowledge; since, indeed, this very anxiety to force a note, which should only be heard as an undertone, distracts the artist from his work and sets the public off on a wrong track.

"A War Dispatch at the Hôtel de Ville." (A. C. Gow, R.A.)
(By permission of the Corporation of Liverpool.)

Meissonier selected themes that allowed him to display skill, but without any attempt to point a moral. Born in 1815, he was an ardent student just when the French "Romantic" school of art and literature had upset all the comfortable traditions, and had called upon men to look about them and seek their subjects from the things about them, since nothing is common or too poor for art: the magic power of light can transform a hayrick into beaten gold.

The young artist was quite in sympathy with this new movement. The pretty sentimentalities so dear to French art in those days—the simpering and posing courtiers passing their time in inane amusements, or the still more trying peasants weeping over dead sparrows—were swept aside roughly; and we find the accomplished Meissonier, fresh from his study of old

Dutch art, seeking his subjects among cobblers, beggars—among the commonplace, by preference—as though to prove to the world that art can weave the beautiful out of the most unlikely materials.

For all ruins are picturesque and "romantic;" the ragged coat, the broken arch, or the withered tree has artistic possibilities denied to prim, pragmatic perfection; while the softening veil drawn by time over the past places all things in a new and quiet atmosphere which rounds off the angularities and hides all unpleasant features.

It is therefore not surprising to find Meissonier turning his attention to the picturesque days of Louis the Fourteenth—to troopers, chess-players, and hunters in the gay colours and quaint gear of a vanished age. He took infinite pains to secure accuracy. He ransacked all the *bric-à-brac* shops where ancient swords, pistols, stirrups, pots, pans, and glasses lay in most "admired disorder;" his busy pencil took notes of old châteaus, inns, and courtyards still to be found in outlying villages; he borrowed costumes from his wealthy patrons, who turned out their ancestral wardrobes to suit his models; he studied boots and buttons like a professional antiquary. With these as his materials, and with his masterly power of drawing men, horses, architecture, and—in a lower degree—landscape, he painted tiny pictures which are an abiding delight.

And yet it is difficult to say that he displayed imagination and creative power. His hand was a perfect recording instrument, his eye unerring. So closely had he pressed into the past that he seems actually to have revived the *types;* for every century has its superficial differences—the court beauties and high-bred women that show on Gainsborough's or Sir Joshua's canvas being quite unlike Sir Peter Lely's more luxurious type, and this again differing entirely from the Victorian.

Meissonier's soldiers, innkeepers, and card players recall instantly the men pictured in the paintings of the late seventeenth century, and so far he must be praised for re-creating, if not creating, in art. Moreover, one never feels that here are academy models posing for a painter. They all look interested in what is going on; they are alive. For though Meissonier took immense pains to select suitable models, this would have gone only a little way if he had not been able to see *beyond* them into another age, using them only as the stuff of his imagination. But there is little in common between such an imagination and the glowing imagination of such men as Bastien Lepage, who could invest a simple country girl with all the mystery and religious exaltation proper to a Joan of Arc. Think of the poetic feeling that reveals itself in Watts's portraits or subject pictures; or in Alfred Stevens's monument to Wellington; or in Raphael's cartoons and Michael Angelo's sculpture; or in William Blake's coloured engravings; or, in fact, in any one of the great men whose *workmanship* seems inspired. It is hard to say that in this particular Meissonier can come among that select company. Intensely clever, patient, armed at every point, he yet seems to lack that strong feeling which, for want of another name, is called poetry in art.

"The Wayside Halt" is a case in point. It is a delightful picture to live with—bright and cheerful in subject; admirably composed, with the Frenchman's inborn sense of theatrical fitness; each figure absorbed in its own action, and apparently with no eye to the spectator in front; the individualities well marked and even humorous; and with bright colours to keep up the brilliant tune. The bay horse in the background has a green-coated rider; the horseman in front, with his red coat, harmonises well with his black charger; and the white horse is mounted by a man in blue. White, black, brown, green, blue, red—a rich and warm setting; while bright notes glance about in the touch of red on the roof, the white linen worn by the gray-coated woman, the speckled poultry.

It is just a pleasant scene—idea! but not poetic, reposeful, and with no more exciting action than drinking. Another minute, and the riders will clap spurs to their horses, will canter away discussing pleasant things, the poultry will get over their momentary excitement, and the old inn will go to sleep again. This repose of Meissonier's is characteristic. "Yes," said his detractors, "too much repose in your pictures. Lay figures planted on rocking-horses!"

Stung by this, and to prove his ability to paint action, the artist sent to the Paris Salon his well-known "La Rixe," in which two officers, having fallen out at cards, are desperately trying to get at each other with their swords, and are as desperately held back by their comrades—action enough for a battlefield.

And in all his work, however much he may be blamed for a hard, metallic, and (as some call it) "finicking" style, there is present always a dignity and a completeness that command respect. Though he looks at Nature through the wrong end of the telescope, yet with his humour, his knowledge, and his perfect technique Meissonier must always be regarded as the accomplished artist who just misses that imaginative setting which distinguishes the more poetic painters.

"A War Dispatch at the Hôtel de Ville." (A. C. Gow, R.A.)

So powerful and successful an artist (for his pictures sell for thousands of pounds) is bound to have numerous followers.

It was not long before the Parisian public were outfaced, at every picture exhibition, by troopers, and priests playing chess, and *chic* servants perilously balanced on high-heeled shoes—in short, by all the weak works that usually follow in the wake of a successful painter. One critic, in his picturesque French manner, exasperated by this outburst of inane pictures, abused Meissonier roundly, telling him that he was directly responsible for inflicting on the public these new horrors—pictures in which were dukes "with labourers' legs and noses long as a trumpet, marchionesses who appeared to be dreaming of the thin broth they skimmed the day before, sergeants less disposed to assassinate the enemy than to drink a pint of cheap wine."

Of course, such followers are inevitable. They are the painters who seize on the most salient points and exaggerate them; with no originality of their own, they contrive to make a style ridiculous.

Meissonier has many followers in England, but among them such painters as Mr. Crofts and Mr. Gow are far enough from being slavish copyists. They have their own individuality, though they are attracted by the subjects and the style of the fine French painter; and this individuality counts for everything. Besides this, they do not paint in Meissonier's small key, and do not therefore hamper themselves in their efforts to maintain breadth.

Mr. Gow's "War Dispatch" is admirable for its general effect. The daylight floods the room, while, with-

out, the sunshine is suggested with great cleverness. Like his master, Mr. Gow escapes the pitfall of expressing merely the posed model, standing uncomfortably in an unusual costume at so much an hour and bored with his task. They appear to be interested actors in the scene.

The travel-stained soldier, who has ridden hard to bring to Paris the news of another glorious victory, is sharply contrasted, in his stern and military bearing, with the lolling youth who has only smelt powder at a shooting-gallery and is content with his lot; and sharply contrasted, too, in his military directness with the keen-faced statesman—clever, unscrupulous, and quick to feel the public pulse and to choose the dramatic moment for announcing the news.

The eager upspringing of the man who leaps to the chair to shout the good news is made both more vigorous in action by contrast with the lolling and inactive youth, and also is artistically connected, by that same figure, with the soldier bringing the news.

The man at the window is thus the chief point of interest, and is made more important still by the upright lines of the window, as well as by the bright sky upon which he is silhouetted. A great crowd below has gathered in expectation, drawn together by the hard-riding soldier clattering over the stones. We enter easily into the spirit of the scene.

It need hardly be pointed out how closely Mr. Gow follows Meissonier in his care for exact drawing, his passion for accuracy, in his skill in rendering texture, and in his dramatic statement. He has selected a moment crowded with excitement, differing in this from Meissonier's habit; but he has not overdone the action, though by concentrating it entirely in one intense figure he makes his statement more piquant still. Whether he is equal to Meissonier as a draughtsman, or whether he has an equal spacious power of theatrical composition, is a matter of question. The French artist had an extraordinary insight into appropriate action, and perhaps even a stronger feeling for the just disposition of his figures—a power that seems ingrained in Frenchmen. Mr. Gow's feeling for light and atmosphere is also equally characteristic of British art, which has always paid reverence to this supreme excellence.

EDITORIAL NOTE.

THE present issue contains the last of Mr. Ryle Smith's articles on his work at Broughty Ferry Academy. We have received letters of commendation on these papers from both home and abroad. Mr. Smith has shown what can be done in good elementary and secondary departments of a Scotch school. The illustrations—which have been restricted entirely to children's work—show the standard that may be reached by a successful, hard-working teacher. The drawings naturally lose a great deal owing to their reproduction on a comparatively small scale and to the absence of colour, but they clearly show careful and accurate drawing and an appreciation of light and shade. We would also call particular attention to the grading of the course, culminating in such studies as those shown on Plate 3, page 203. Teachers may safely follow the lead which Mr. Smith has given them in these articles in framing schemes of drawing for their classes.

With the desire to make this feature of the "Art Section" as helpful as possible, and to give teachers a knowledge of the best of modern thoughts and ideas on the teaching of drawing, we have arranged with Mr. Charles M. Carter, superintendent of the North Side Schools in Denver, U.S.A., to prepare an illustrated series of articles on the work done under his supervision.

Mr. Carter is one of the very foremost art teachers in the States, and is keenly interested in the developments that are taking place in art teaching throughout the world. His papers will enable teachers to see exactly what is being done in America, and will deal with the aims underlying the work and the methods of carrying them out. We hope to give the first article in our next issue.

HONOURS PAGE.

HONOURS have been gained this month by—

1. Doris Maude (11), National School, Lightcliffe, Yorks.

2. Joseph Ranson (9), Chilton Moor Boys' School, Fence Houses, Durham.

3. Annie Holgate (12), National School, Lightcliffe, Yorks.

4. Owen Oliver (17), Collegiate Grammar School, Southwell, Notts.

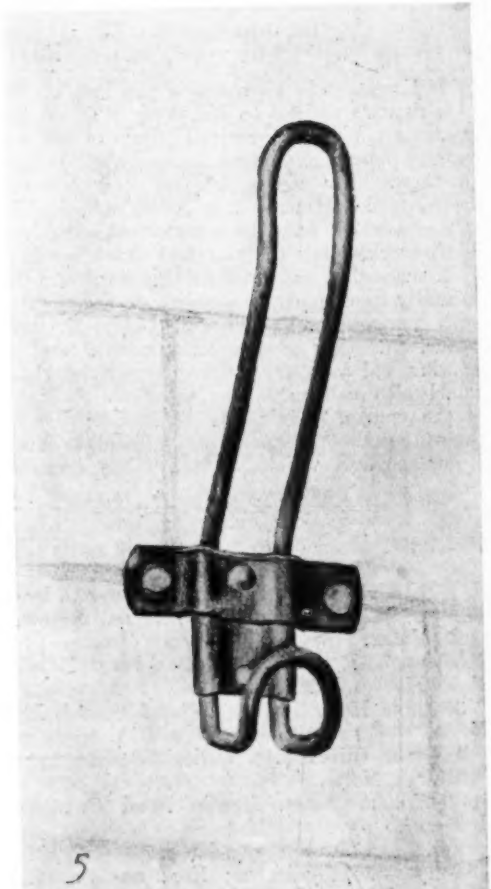
5. William Jones, Mantle Road Council School, Leicester.

Nos. 1 and 3 were very good simple studies in colour, and most carefully drawn; No. 2 was a chalk drawing on brown paper; No. 4 a very careful drawing in pencil, the claws, beak, and texture of the feathers being particularly well rendered; No. 5 a bold pencil study of a common coat-hook. Many such objects abound in every school, and provide capital exercises. We are most pleased to see the juniors so well represented this month.

The following boys and girls sent in meritorious drawings, though not up to the "Honours" standard: Emily Crossley (13), National School, Lightcliffe, Yorks; Victor Jackson, National School, Lightcliffe, Yorks; Arthur Cowley, Paulers Pury School, Northants; A. Carr (11), Sulyard Council School, Lancaster; Florrie Guelder (12), Boothferry Road School, Goole; Florence Lidguard (12), Boothferry Road School, Goole; Albert Wright (13), Cathedral School, Great Charles Street, Birmingham; William Marshall (12), Tillmouth Council School.

Not the least interesting thing in connection with this page are the letters we receive from successful competitors. Here are two recently sent by William Grant and Beatrice White:—

"DEAR SIR,—Thank you very much for the nice prize; I will now take double interest in my work, being able to use my own instead of school colours. I appreciate the box very much."



Honours Page.

"DEAR SIR,—I thank you very much for the prize which I received about three weeks ago. I did not think that my work was nice enough to be copied on to an Honours Page. I find the paints very useful, and I like painting as well as any other school occupation. It is very kind of you to give prizes away for painting and drawing. I hope that many others may win prizes, and be as pleased as I am to think that they have won a prize, because it is an honour."

Drawings for this page can be sent at any time addressed to *Mr. Vaughan, 7 Campside Crescent, Langside, Glasgow.* The scholar's name, age, and school address should be written on the back of the drawings.

THE HISTORY LESSON AND DRAWING.

BY W. H. ELGAR.

IV.—THE NORMAN PERIOD.

THERE is little doubt that the commencement of the Norman period is one of the best remembered periods of English history. Who does not remember the date of the battle of Hastings, and know something of the curfew bell, the Domesday Book, and the forest laws, if many previous or subsequent events are forgotten? Then the remains of great castles and churches spread over our land have, in the majority of instances, no parts earlier in date than the Conquest. A period of organisation and rapid progress, even if of hardship to many, had commenced, and the story of such periods is almost invariably remembered.

FIG. 1.

FIG. 2.

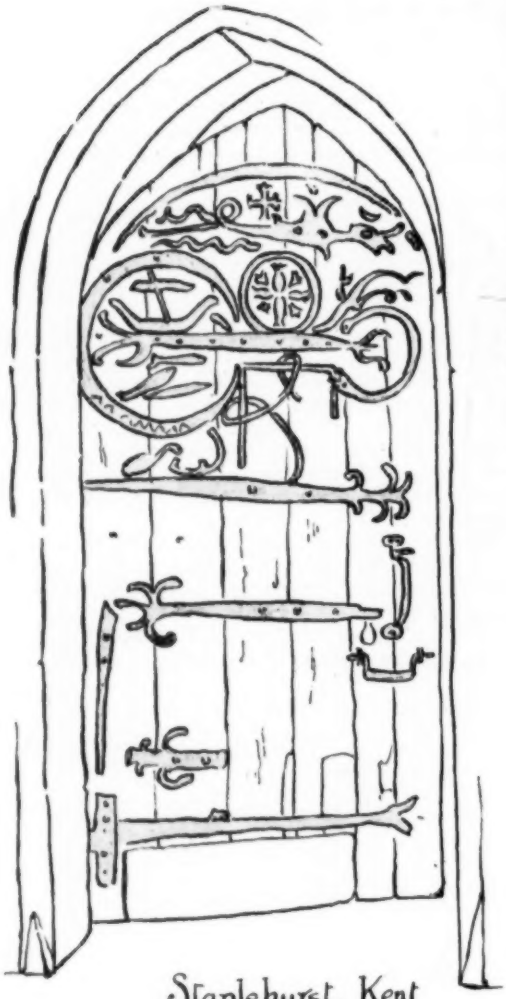
It would seem that there is less necessity to call in the aid of the pencil and brush to help with the study of the Norman period than with others; but if the visual conception of this important time is to be at all equal to the more or less abstract ones gained from reading, there appears to be reason for more than usual effort.

Rather more than usual effort will be necessary on the part of some if any number of Norman relics suitable for children's study are to be found within easy distance.

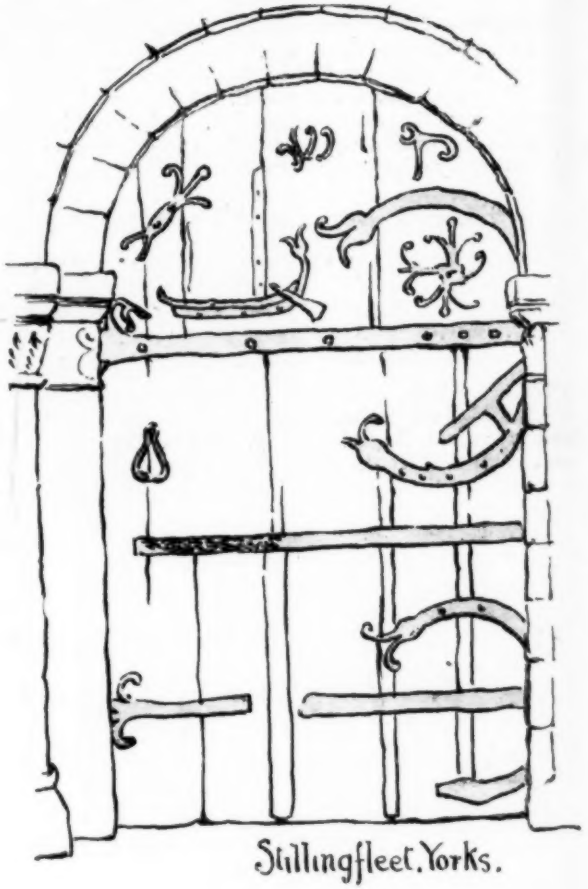
If historical readers be consulted for hints for this work, they are mostly disappointing: a picture or so of some battle, more or less imaginative, a few photographs of buildings or portions of the Bayeux Tapestry, or figures from manuscripts almost inaccessible to the ordinary man—nothing that the teacher can follow up.

FIG. 3.

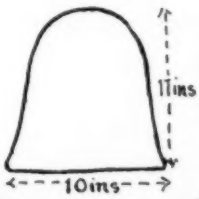
Photographs of the Bayeux Tapestry, even complete sets, seem to form the very best illustrations that could be used for young children to get an idea of this period. The processional idea, the comparative isolation of the

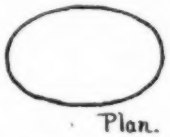


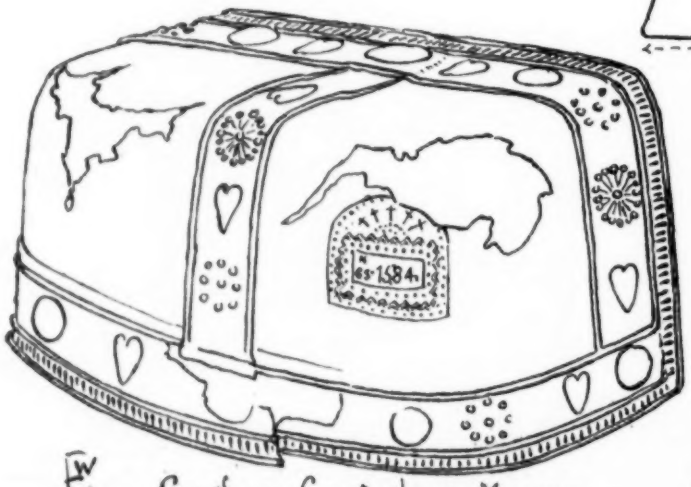
Staplehurst. Kent



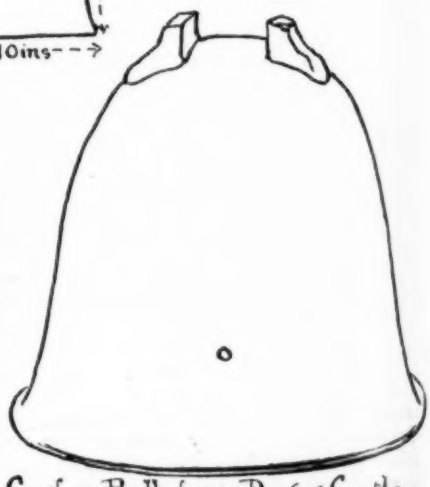
Stillingfleet. Yorks.







Curfew. Canterbury Museum.



Curfew Bell. from Dover Castle.

PLATE I.

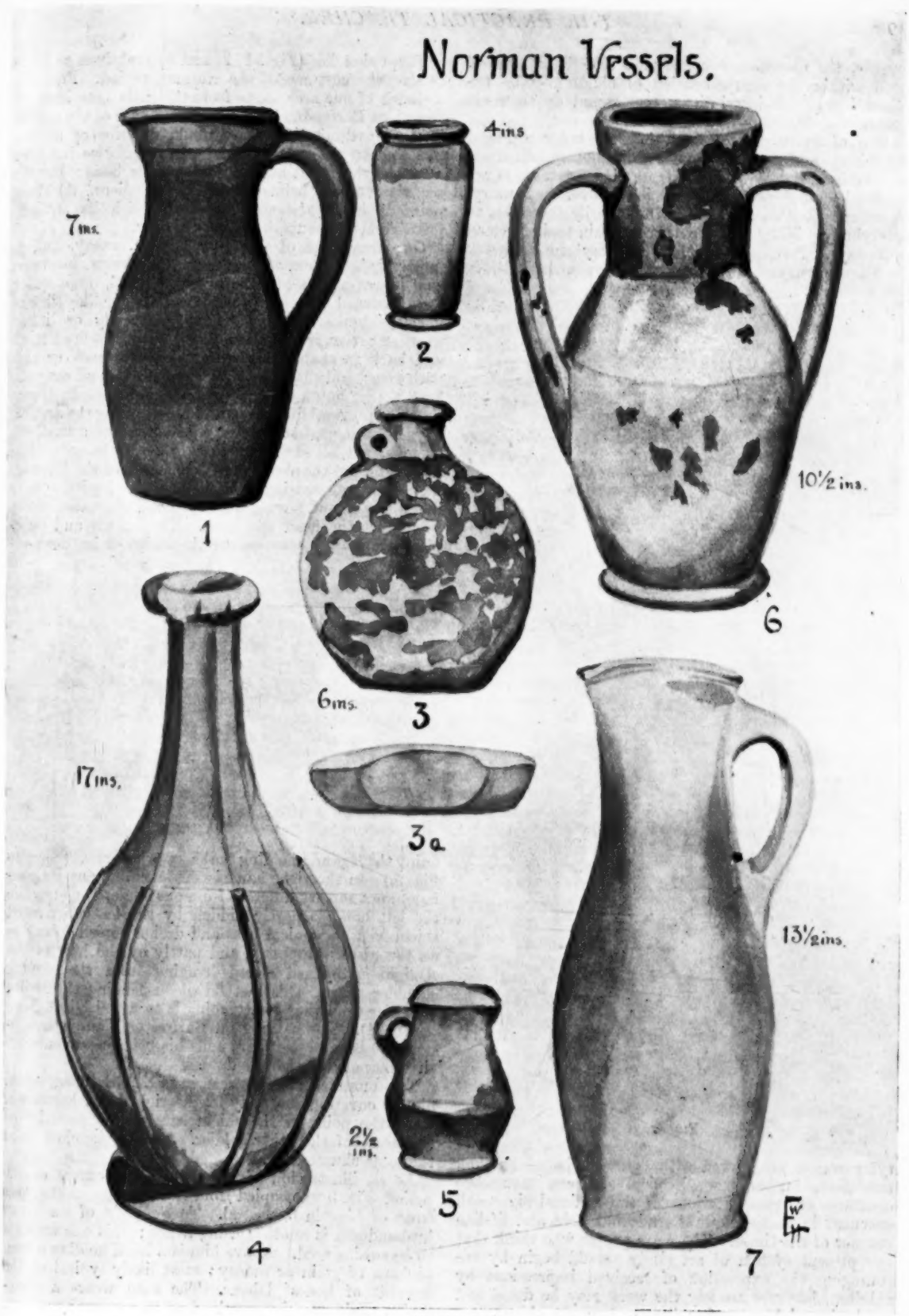

Norman Vessels.
7ins.
1
4ins
2
6ins.
3
3a
10½ ins.
6
17ins.
4
2½ ins.
5
13½ins.
7

PLATE II.

figures, the diagrammatic attitudes and detail, are all well within the comprehension of children. The explanation of the inscriptions, too, would do them no harm.

But, of course, drawing from the flat is not encouraged at this time of day, so copying such photographs could not be indulged in to any extent. However, there are still to be found, pretty well distributed over the country, representations of Norman costume easily accessible to everybody. Many of our churches retain their Norman doorways. Perhaps the doors, anyway the ironwork of the doors, and often the arch stones, capitals, or

Fig. 4.

tympanums, are carved with figure subjects—knights, musicians, husbandmen, Biblical subjects, monstrous creatures or representations of the zodiacal signs—all executed in that somewhat crude but bold and lifelike manner of the times. There are people who think that our present system of art study should begin by encouraging the expression of received impressions by children, however crudely the work may be done, and not by invariably drawing directly from the object.

Three sketches (Figs. 1, 2, and 3) are given as illustrating the costume of the Norman period. Fig. 1 is a sketch of one arch stone from the little Late Norman church at Barfreston, in Kent. The figure of the soldier is what a decorative artist would describe as accommodated to the space he had to fill. Notice the long arm, the shortened body, and the large head; but we see the conical helmet with its nosepiece, the long pointed shield, the straight sword with its straight guard, and the hauberk, all very plainly.

Our knowledge of this last is very scanty, and is mostly gained from manuscripts. We know, however, that it was a shirt of some tough material, upon which were fastened plates of metal overlapping like tiles of various shapes, or rings either separately or linked together; that it had sleeves, was slit up both at front and back to enable the wearer either to walk or ride with ease; and that it was put on and taken off over the head. (See figure in the Bayeux Tapestry.) In Dover Castle are several life-size figures representing the armour of the great periods. Most of them have actual old armour, and all of them may be taken to be authoritative. Fig. 4 of the above plate is a sketch of the Norman warrior there, wearing a hauberk covered with square metal plates, and having a coif or hood of smaller plates to protect the head and neck. The helmet and nosepiece are plainly seen, as are the strips of leather con-

Fig. 5.

fining the legs and holding the short prick spur. (See also Fig. 5.) In the right hand is the lance, having its gonfanon, not so very different from our modern one; while the left hand is partly hidden by the leather-covered shield with its conical boss and design copied from one on the historic tapestry, and partly by the haft of the straight two-edged sword hanging from the sloping shoulder-strap. This method of suspending the sword is earlier than that of attaching it to a waist-belt (seen in Fig. 1). The carving on Barfreston Church is supposed to be Late Norman, and this belt goes to support the other evidences of its date.

Two mounted men are seen in Fig. 2, the long shield almost covering the body of the right-hand horseman, while the point of the shield can just be seen below the horse of the other soldier. This is sketched from the same church door.

As an illustration of the dress of labourers of the period, Fig. 3 was copied from the carvings on the west front of Lincoln Cathedral. To the right of the given husbandman is another using a hoe; this one appears to be sowing seed. Above him is a hand holding a bag, perhaps of grain or money; most likely typical of the rewards of honest labour. The man wears a close-fitting tunic or shirt, confined at the waist by a belt,

and it is believed that the hauberk was simply this woollen garment translated into mail. It should be remembered that the peasantry were similarly clothed throughout the Middle Ages, and that sacred personages in these carvings are not usually clothed in the fashions of the times, but in that of the early Christian period, and so are not of much value for our present purposes.

Ironwork on doors gives good practice for somewhat easier stages than do the figures. Occasionally it is especially interesting, like the two examples given in Plate I. of Staplehurst and Stillingfleet. Besides the usual broad curved hinges and strengthening straps, these doors are embellished with monsters, serpents, birds, fishes, and galleys. The crude galley on the Staplehurst door has mast and sail, while the Stillingfleet galley is much better formed, has a highly decorated stern, and is furnished with steering apparatus. The figure above is supposed to represent a human being. Most of the hinges remaining are, like those on the Stillingfleet door, partly hidden behind the stonework, as they could not be so easily wrenched off; for churches in our period often were the objects of attack on account of the valuables they contained. This accounts for many doors being almost entirely covered with ironwork, often of a beautiful character.

One hinge would form a good exercise for a young pupil; and perhaps the way they are here drawn is as good as any—a pencil outline washed with colour and inked in, a method rather popular sometime since. It is rather difficult to tell exactly to what period hinges belong without a knowledge of historic ornament, but a general idea can be gained by remembering that early ones have the great convex curved arms like the Stillingfleet ones, that the ornamental projections are short and rather stiff, that the straps are somewhat irregular, have chisel marks in crosses and zigzags (see curve on Staplehurst one), and that the hammer was the principal tool used in making them.

On the same plate are sketches of a curfew and a curfew bell. As is well known, the curfew was a metal cover placed over the hearth fire for the purpose of preserving the embers until the morning, when they would be fanned into life again. Very few of these remain, exposed as they were to rough usage, and none perhaps earlier than the fourteenth century. But the curfew is so inseparably connected with the Conqueror that this sketch of one in Canterbury Museum is included. It bears the date 1594, has two rather bad holes, but is typical of most of those remaining. The writer knows of two at South Kensington, one at Brighton Museum, and one in Farnham Museum, Dorset. There may be many more either in private hands or in local museums. They are all probably of metal plates riveted together because of the heat, and strengthened by bands round the edges and up the centre. This centre band is in the Farnham example looped to form a handle.

A most interesting oval-shaped bell from Dover Castle, now in Canterbury Museum, is next sketched. It is by no means large, only ten inches in diameter, and eleven inches high, and it has a small hole drilled in one side, what for is not quite plain. Probably this bell was discarded because the pieces by which it was hung (canons) were broken off, and it would lead to some useful observations if attempts were made at suggestions as to the manner in which such a bell was suspended. Two little notes explaining the shape more clearly are added. Such graphic notes should accompany rapid drawings made in museums and such places, as they often help to explain many points which perspective sketches do not. It may not be altogether out of the way to remind the reader that the Conqueror did not introduce the ringing of the curfew bell, but only enforced it.

Norman vessels are not very numerous in our museums, and many which are preserved are by no means perfect. Those forming Plate II. were all sketched one day last February in Canterbury Museum; but similar examples are in the British Museum. It may be said that the examples illustrated are mostly from one district, and that district is not particularly rich in Norman relics. The writer has done what others are encouraged to do —that is, to look around for illustrations of whatever period is being studied, and generally the searching will not be in vain.

The pitcher (Fig. 1) is decidedly clumsy looking. It is thick, almost black in colour, and the glaze is either gone or maybe it never had any. Its thick handle passes rather low down, there is but little difference between the size of the neck and the body, and the lip is scarcely marked at all.

Several of the foregoing remarks apply to Fig. 7, but this one is light red, unglazed, and the handle is of decidedly a substantial kind, and well buttressed at its junctions.

Fig. 6 is a two-handled pitcher, bright yellow, glazed, and with a decided rim at the bottom. It is interesting to note the gradual development of the rim in Figs. 7, 6, and 2. The spots on Fig. 6 are reddish blotches of colour.

A pilgrim's bottle (Figs. 3 and 3*a*), pale green, and mottled with darker green on one face only, is a rather rare Norman relic. This flat form, with one eye only, was succeeded by several rounder and taller shapes, of different materials and colours, until we reach the harvester's bottle of the last century and the drinking bottle of our present army. Pilgrims' bottles will probably come in for more attention when treating of Chaucer's times. The little jar (Fig. 2) is very modern in its look, pale yellow below, darker above; but the smaller jug below (Fig. 5) is very clumsy, and of a dirty yellowish gray colour, very likely not improved by its age.

Perhaps the copper flagon (Fig. 4) is the most interesting of all the vessels shown. It is octagonal, almost regularly and very carefully made, strengthened at its rounded body by fillets, and provided with a nicely-rounded lip and a broad base. It was dug up along with another very similar, though not quite so perfect, when digging the foundations for the new archbishop's palace at Canterbury, and is labelled as of twelfth or thirteenth century. There is just the possibility that this very vessel was used in Becket's dining-hall.

No better conclusion to these few suggestive remarks could easily be found than to repeat the advice found near Sir Christopher Wren's resting-place, "*Circumspice.*"

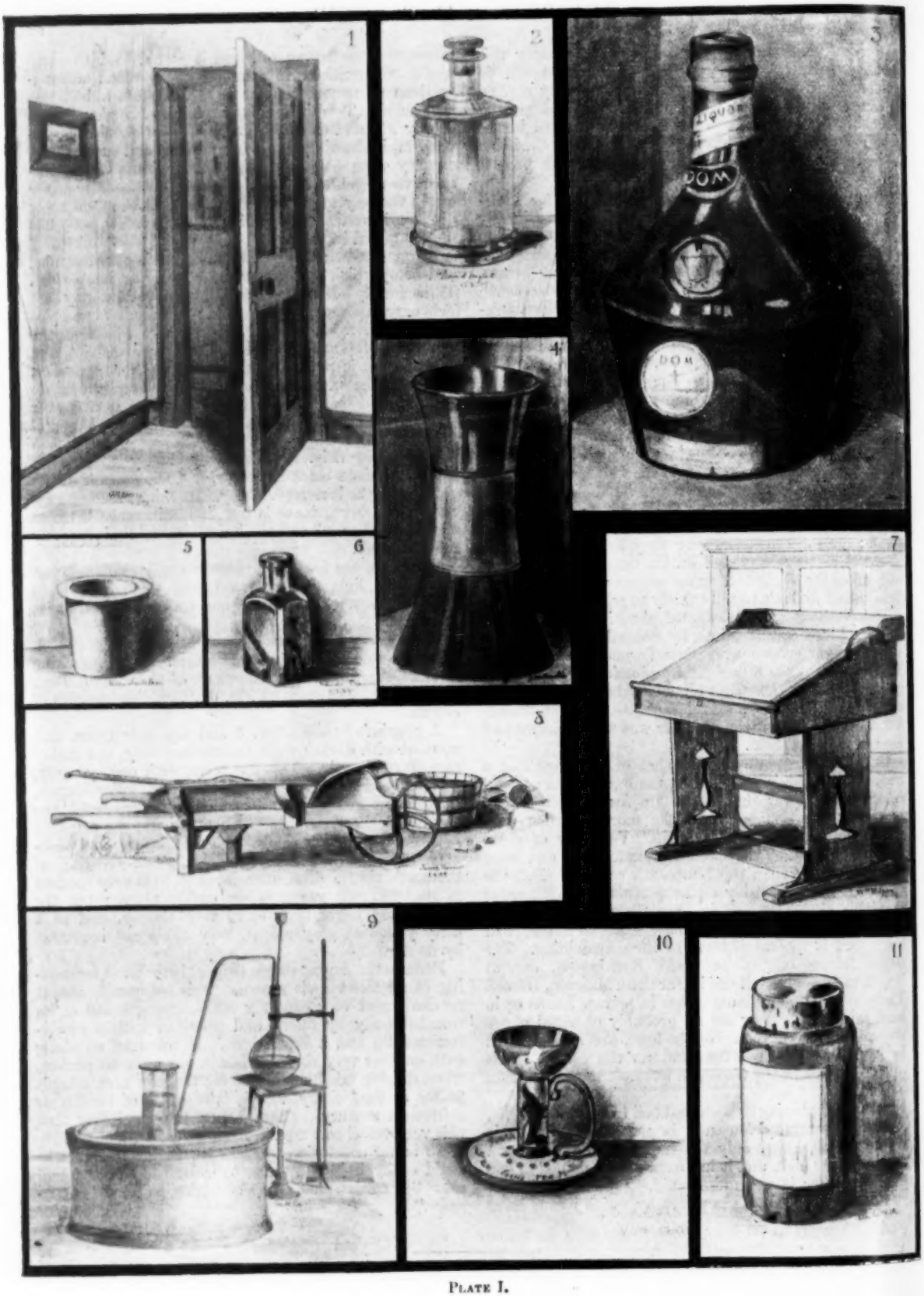


PLATE I.

DRAWING IN PUBLIC SCHOOLS.

I.—GROVE ACADEMY, BROUGHTY-FERRY.

BY W. RYLE SMITH.

HIGHER GRADE DEPARTMENT, PART II.

OBJECT drawing is the most important subject in our course; and although not the most popular to begin with, in time the best pupils realise its value, and work accordingly. In the selection of objects—which has an important bearing on the work—we get many excellent examples from everyday things. To begin with circular objects, we have cups and saucers, teapots, jugs, bowls, bottles, tumblers, tin cans, candlesticks, etc., of various shapes, sizes, and colours. Then in regard to straight-lined objects there is a great variety of boxes of all sorts, such as chalk, cigar, colour-tube, and match boxes, also books, etc. A considerable number of the things above mentioned are brought to school by the pupils. We spend a small sum yearly on the purchase of vases, draperies, etc., and have a number of examples of Dutch and other potteries of good shape and colour, obtained at a comparatively small outlay.

At the beginning of the first year's intermediate course, the principles pertaining to object drawing taught in the lower school are revised. These are principally the perspective representations of horizontal circles above and below the eye, and horizontal and oblique straight lines; also the constructions for attachments, such as handles and spouts to circular and other objects.

These are all done by demonstration from blackboard, the pupils having the actual things before them. Light and shade are discussed, and methods of representation by line and mass demonstrated.

Examples of the work of well-known "line" men, such as Linley Sambourne, Joseph Pennell, and Bernard Partridge, are exhibited in the classroom, and prove a great help to pupils in forming a style in pencil work.

Very few of the pupils of the first year of the intermediate course attempt more than one object at a time; and when it is small, each pupil is supplied with one, which is placed on a flat portion of the desk meant for the purpose. To prevent any trouble with the light and shade of the object, it is placed within a corner of paper, which shuts off any light that is not desired.

Examples of first-year work are shown in Nos. 2, 5, 6, 8, 10, and 11 on Plate I. No. 8 is one of a set of drawings done by a section of a boys' class outside, where an extension of the school is going on; several drawings were also made of the buildings in course of erection. No. 9 is the work of a second-year pupil. We strongly favour this kind of group, and the pupils enjoy doing it.

Doorways, school lobbies, and school furniture afford very good material for drawing subjects. Nos. 1 and 7 are by third-year pupils.

The tone drawing, No. 4, is by a third-year pupil, and No. 3 by a junior student. We do not encourage work of this character until the pupil has had considerable experience in painting, because we think that is impossible for one without this experience to give a fair rendering of the different colour values in black and white.

During the second year of the course the representation of objects in colour gets an equal share of attention with those rendered in light and shade. To begin with, we set up one object only, such as the crock, No. 6, Plate II., six or eight pupils working from each model. Great care is exercised in the drawing of such an object; the colour is discussed, the gradation necessary to bring out the *round* form being duly studied.

When *groups* of small objects such as Nos. 5, 7, and 8 are set up, one group is required for each individual, arranged on the flat part of the desk. Match-boxes make specially good colour studies, and we regret that these cannot be presented in their strong contrasts of blues, yellows, greens, reds, and purples. Books, too, such as those shown in Nos. 3 and 4, present a pleasing variety of colour, and are very good drawing exercises. These two last mentioned belong to the third-year course, when almost every candidate for the Intermediate Certificate is working in colour. No. 2, representing a group from the workshop, proves a good colour study in quiet tones of yellows, browns, grays, and purples. No. 1 is a study in yellows and greens—the parcel is tied up in green paper—with purplish-gray shadows; these also belong to the third-year part of the course.

The four studies on Plate III. are all post-intermediate work. The pupils who painted Nos. 1, 2, and 3 obtained the Intermediate Certificate last year, and No. 4 sat the examination in the spring. They all prefer painting to pencil work. With the exception of No. 1—the drawing of which is comparatively easy—special attention to the *perspective* of the subjects is demanded, and a considerable amount of drill work is gone through in preparation.

Visits to picture galleries are arranged for the advanced pupils of the school from time to time, and in order to prepare for these visits reproductions—either in colour or in photo-lithography—of the works of the artists whose pictures are on view, are exhibited in the classroom. We find that a very great interest is aroused amongst the pupils by these exhibits of prints. Any information which can be given of the lives of the artists is eagerly listened to and noted. Artists are more or less specialists, and very soon they become known by the kind of subject they paint and the way they do it, so that when a gallery is visited many of them are hailed—through their pictures—as old acquaintances.

Scale drawing in the higher-grade department is a special subject, and is only taken by boys who intend to become engineers or architects. A few blackboard demonstrations are given at the beginning on the principles of drawing from actual measurement. Exercises on the use of the mathematical instruments required and hints on "inking in" follow in due course. Specimens of "working" drawings for engineers' and architects' "plans" are shown and explained. Thereafter the work is done from actual things—engineering and architectural details—dimensioned sketches preceding the drawing-out to scale.

Visits are made to engineering works and buildings in course of erection.

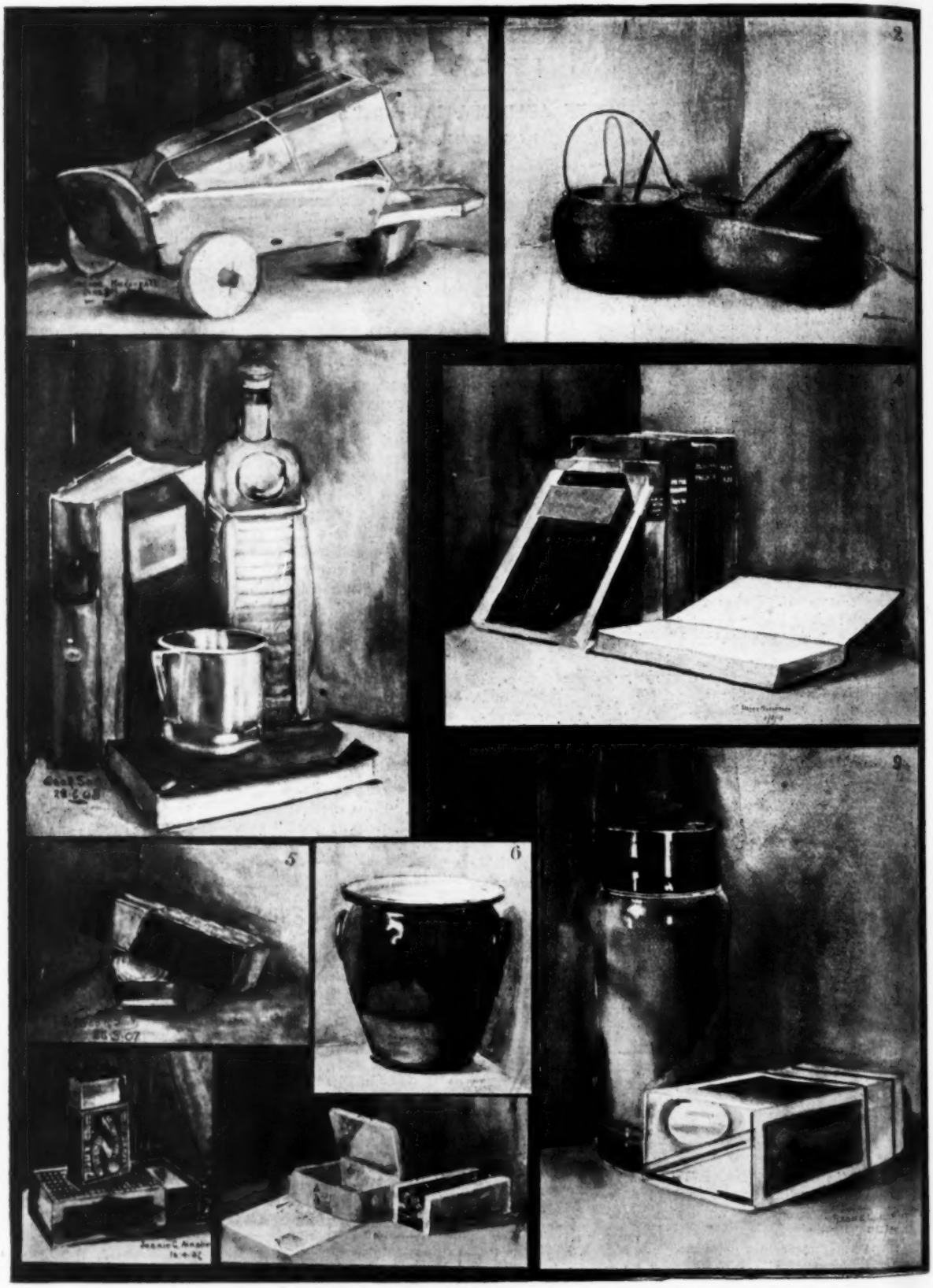


PLATE II.

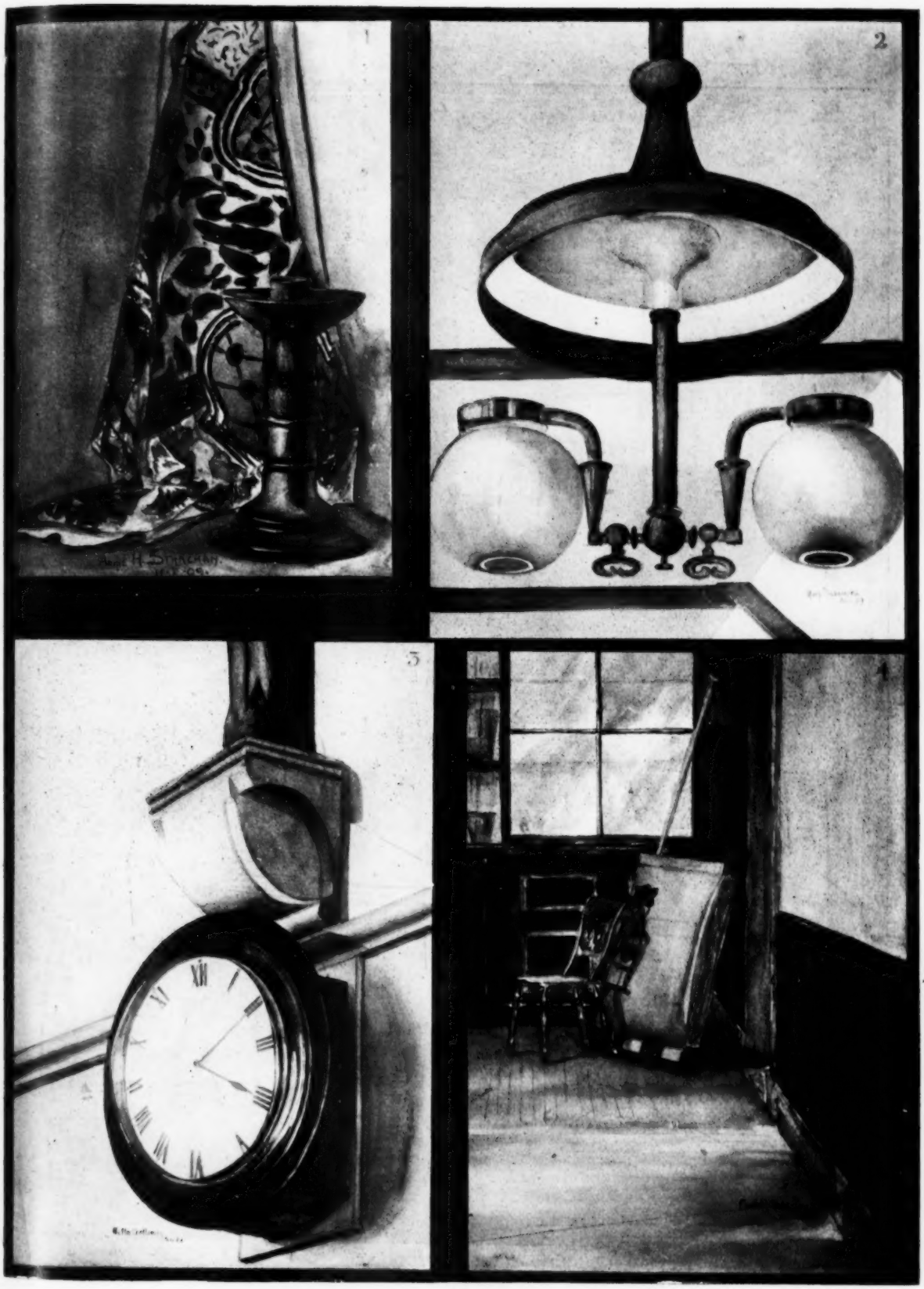
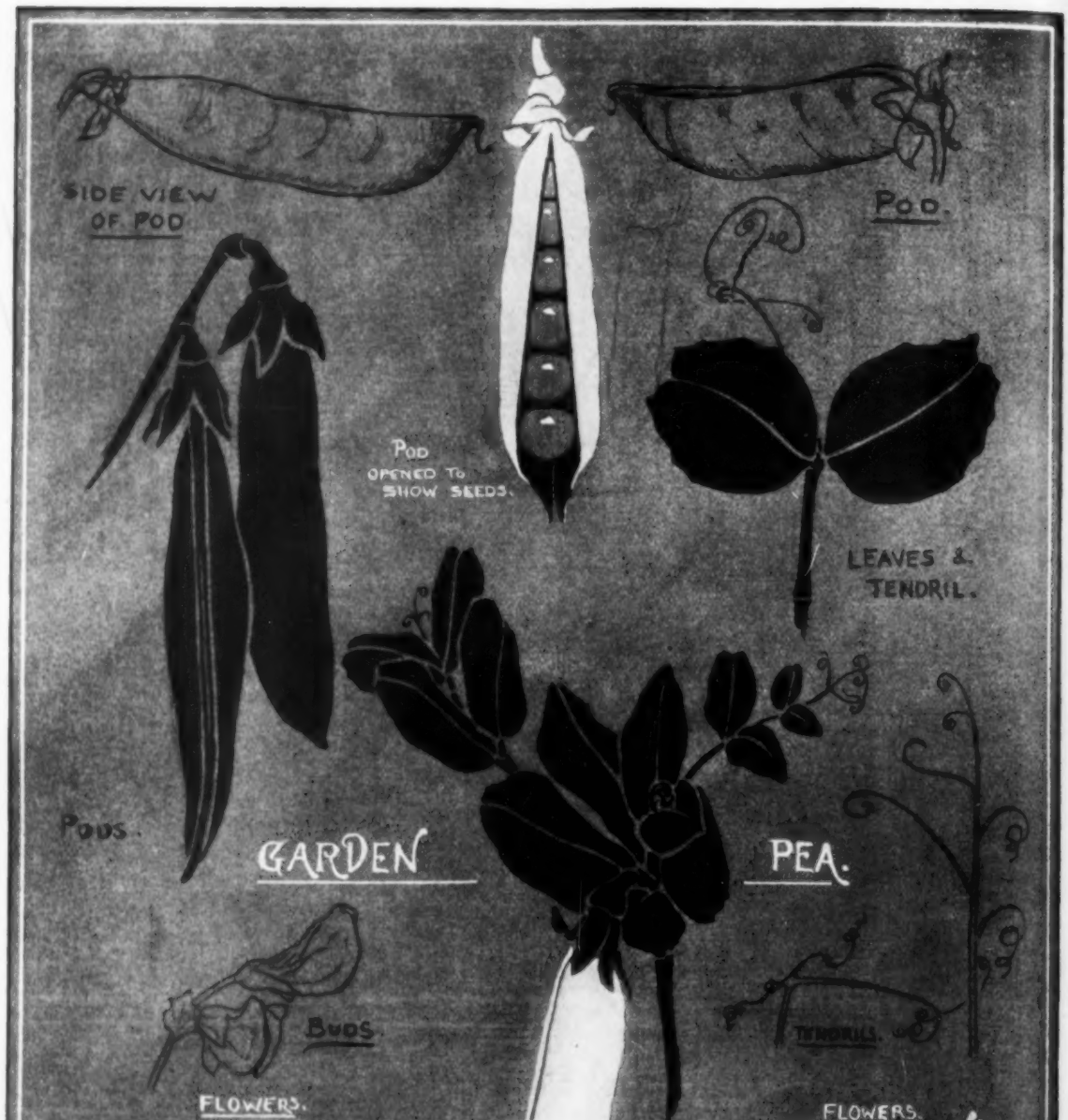


PLATE III.



NATURE STUDIES.

NOTES AND SUGGESTIONS ON THE TEACHING OF EXPERIMENTAL SCIENCE, MATHEMATICS, AND DRAWING.

BY C. HAMILTON.

(*Continued from page 151.*)

Section XV.

THE first year's work will conclude with some elementary work in mechanics. The simplest notion of force, perhaps, is the effort we exercise when lifting a weight. The attention of the class should be drawn to the fact that we can exert force without any apparent result, as in pushing against an immovable table. A man used to handling weights can judge to a nicety the weight of a parcel; he recognises the degree of effort which is called forth.

In breaking new ground like this, it is desirable to keep the notion as simple as possible. To talk about magnetic and other forces, like all attempts to explain the known by the unknown, is confusing. You may talk Greek to a man if he knows Greek, but not otherwise. (Of course, if you want to swear at him, by all means use a language which he does not understand.)

The class may be asked for suggestions for comparing forces—that is, for comparing two pushes or two pulls or two so-called weights. If you can elicit the proposal to use a spiral spring before the lever balance, so much the better. Ask the student who suggests the spiral spring whether he is sure that the spring will always stretch the same distance with the same weight, and get the class to see that it ought to be tested first. Overstrain a small spiral spring, and thus show the limitations.

There seems to be no special reason why an experiment of this kind should be done by every member of the class; but if the teacher elects to "demonstrate" the law of extension, he should use an apparatus which is large enough for the whole of the class to see clearly. For this purpose a spring about 18″ long, with coils 1″ to 2″ diameter, stretching 3″ or 4″ to the pound, would be infinitely preferable to the toys often found in school laboratories.

The golden rules in most of the experiments in mechanics are to use strong, steady apparatus and heavy weights. Don't try to measure too closely; don't let the students have the impudence to imagine that they are establishing or verifying physical laws; don't let them get disappointed by aiming at a degree of accuracy which the apparatus will not allow; and don't make a numerical result the sole aim of the experiment.

To return to the method of comparing forces. Having tried different weights and noted the extensions, let the results be plotted on squared paper. Hang intermediate, greater, and smaller weights, note the extensions, and let each member of the class check the results by the curve he now possesses.

The students may now pass to the other method of comparing forces—namely, by the lever. In the case of the spiral spring we start from a practical, everyday instrument, so here we start from an ordinary pair of scales. The class should be clear that the lever balance only tells us whether two weights are equal or not. An examination of the balance shows that the lever is supported at the centre. What would happen if the arms were unequal?

The class may now proceed to inquire into the lever, and there ought to be no difficulty in arranging apparatus for each student or pair of students. If the desks are not level, blackboards or 9″ × 2″ timber can be laid across them. Any uniform strip of wood or a 50 cm. scale will serve as a lever, and the best fulcrum is a piece of 6″ triangular file which has been rubbed smooth on a grindstone. Specially made apparatus glittering with lacquer and varnish is not recommended now or at any other time. For supports, a couple of wood-blocks, two chalk-boxes, or two piles of books can be used at a pinch.

The best plan of experiment is to keep one weight and its distance constant and to vary the other. The student then gets a clear notion of a moment and equality of moments.

Both weights and distances should then be varied, and the results set out in tabular form. The final conclusion can be stated as

$$P \times x = Q \times y.$$

It will be useful to ask the class to express first P and then Q in terms of the others, and to throw the equation into the form—

$$\frac{P}{Q} = \frac{y}{x}.$$

The distances of the forces from the fulcrum may then be stated to vary inversely as their magnitudes. Other forms of levers may be considered, but in no case should any reference be made to the three orders of levers—except to condemn the terms as unnecessary. The three orders of levers are never met with outside of some obsolete or hopelessly academic text-book, and it may be doubted whether many practical men could remember which was which.

The lever, in fact, is of very much less importance than the principle of moments to which it leads. The specification of a moment as positive or negative should be introduced at once, and when this is done the need for special names for the three orders of levers disappears.

The use of a small spring balance instead of weights will enable the students to investigate the effect of a force acting at other than right angles to the lever. This stiffens the definition of a moment; and if Section XII. has not been omitted, the class may be led to infer that the effect of a force at an angle with its direction is equal to P cos a, where P is the force and a is the angle. This helps to enforce the value of graphical representation, which will be dealt with more fully later.

The attention of the class may next be directed to conditions under which forces were compared in the spring balance and the lever balance respectively. In the former the forces acted in a straight line, and in the latter they acted in parallel lines. The direction in which the weight of a body acts is thus raised, and paves the way for an elementary description of gravity. In the case of the lever, the downward force due to the weight of the lever is supported by the fulcrum. So long as a lever is regarded as being without weight it is a mere abstraction; in practical problems the weight cannot be neglected.

The class may be led by questions to grasp this, and a demonstration can then be arranged by suspending the lever to a spring balance instead of allowing it to rest on a fulcrum.

The teacher can use his judgment as to introducing the distinction between weight and mass. It is a subtlety which with this type of student and at this stage of progress is not readily appreciated. The writer has hitherto made no distinction between speed and velocity; and acting on the principle of proceeding from broad distinctions to narrow differences, he is disposed to leave mass alone for a time. If there is one thing more than another to avoid, it is to make the school course a pocket edition of the university course. What has to be done is to collate and systematise the common experiences of life, to arrange these in such a way that the logical structure of the subject shall be seen broadly, and to proceed at a later stage to the investigation of detail.

The class should regard the weight of a body as a system of parallel forces, the resultant of which acts at the centre. None but simple cases need be calculated—in fact, only those in which the centre of mass is at the geometrical centre of the body.

A few simple cases of the influence of the centre of gravity on equilibrium should be studied. The question, "Why does a stout man walk with his head and shoulders well back?" rarely fails to interest a class, though if the teacher himself possess a superfluity of adipose tissue there are admirable reasons for choosing a less personal illustration.

There are several toys which are extremely interesting and instructive, while if a more practical illustration is required, a retaining wall of triangular section may be drawn in two ways, with the pressure on the vertical and on the slanting face, and the class asked which is the correct way, and why.

It may be of advantage during the course of the instruction to introduce the simple pulley as a means merely of altering the direction of a force.

Section XVI.

It is proposed at this stage to deal in an elementary manner with work and its measurement. The plain statement that when a force so far overcomes a resistance as to cause the point at which the force is acting to move may be prefaced by the broader consideration of lifting weights through definite distances.

The principle of work may be applied to the lever, but unless there is plenty of time machines in general should not be discussed. The rate at which work is done, or power, ought to be included, but energy is better left to a later stage. Some of these points are, of course, matters of judgment, and the advice is offered merely on the basis of experience. The main reason for the exclusion of a fuller treatment of machines is the desire to reserve these until the students reach the mechanical laboratory at the technical school. Few preparatory evening schools have more than a toy equipment bearing on this part of the subject, and the text-book skeletons are hopelessly uninteresting. A student does not really understand a machine until he handles it in cold steel.

The diagram of work should be explained. Since lines can be drawn of various lengths and in various directions, they can be used to represent forces. The use of a line to represent distance or time is, of course, familiar.

It is perhaps worth noting that in the diagram formed by the quantities which are to be multiplied to give an arithmetical result we obtain an area. The distances in the diagram horizontally and vertically show the relation between the quantities; the area enclosed represents the work done. The rate at which work is performed should be calculated in horse-power. The term is of everyday occurrence in the newspapers, and calculations of this kind can be introduced without incurring the charge of premature specialisation. The fact is, in this age of machinery the language of the engineer permeates the language of daily life, and the man in the street babbles in a tongue of the meaning of which he is but dimly conscious.

The teacher will note the attempt throughout to make the work practical without encroaching on the province of the technical school.

Section XVII.

This section deals with the action of forces at a point. Its justification lies in the fact that nearly all preliminary technical courses include elementary statics, though in the view of the writer, if time pressed, not much would be lost by deferring it.

We may begin by recalling the lessons on force, and ask what is remembered of the experiments. What forces are acting when a weight stretches a spiral spring? The answer required is the tendency of the spring to contract upwards, and the resultant pull between the earth and the weight downwards. Hence these forces are in the same straight line.

Repeat the question with reference to the lever, and ascertain that the class understand that the forces in this case were parallel. Hence the class have dealt with forces in one line and in parallel lines.

The aim of the class should then be stated—To find the effect of forces acting at a point.

Before proceeding to the experiment the nature of the apparatus should be discussed and the conditions laid down. In this case the apparatus will consist of weights to produce the forces, strings to communicate the forces, and pulleys to vary the direction of the forces. Weights are suggested in preference to spring balances, because the latter work well only in a vertical position. The question as to whether the forces meet at a point should not be begged by tying the strings together. They should be attached to a wire ring, or, better, to an irregularly shaped piece of cardboard, which need not be large, and which must, for obvious reasons, be light.

A model experiment having been performed, questions should be addressed to the class to bring out the essential characteristics of a force—namely, magnitude, direction, and point of application. (These will have been taken for granted in earlier work. The specification of a force ought to be stated by the students out of their own experiences, and Section XV. provides hardly sufficient basis for generalisation.)

Since a line can be drawn of any given length, to or from any point, and in any given direction, it is obvious that lines can be used to represent forces, and the whole experiment by a diagram.

If there is sufficient apparatus, the students should perform a series of experiments for themselves; in the absence of sufficient apparatus, the needs may be met to some extent by a series performed by the teacher. In either case, each student should enter up the result and proceed to draw the diagram.

The first thing is to note that the lines representing the three forces in equilibrium meet at a point.

The transition from the actual diagram to the parallelogram may be initiated by remarking that a pull may always be replaced by a push, and *vice versâ*, and altering one of the forces accordingly (the equilibrant by preference).

There are now in the diagram three lines meeting at a point, with their opposite ends upwards. Insist on the fact that these lines still represent the forces in every respect. Complete the figure, ask what it is, and check by testing whether the opposite sides really are equal and parallel. Deal with each experiment in the same way, and ascertain whether an identical result is obtained. Then ask the class to state the parallelogram law.

In passing to the triangle of forces, draw attention to the fact that opposite sides of the parallelogram are equal geometrically and mechanically, except in one respect: they do not both represent the point of application. It has been found that three forces in equilibrium do meet at a point, and that in every way they are represented by the two sides and the diagonal of a parallelogram. If the line representing one of the forces is replaced by the opposite side of the parallelogram, this line represents the force in magnitude, and it is parallel to it in direction. What is the figure now formed? Hence ask the class to state the triangle law.

An Alternative Plan.

An alternative method to the one followed in Sections XV. and XVII. is perhaps worth describing. Having decided that weights may be used to produce forces, an investigation is made into the action of one, two, or three forces upon a body. The body in this case is an irregular piece of thin card, which has a number of holes round the edge into which a small hook at the end of a string can be passed. The card rests on three bicycle balls (from the ball bearings) on a table, thereby avoiding any difficulty as to the weight of the card and obtaining beautifully free movement.

The weights are fastened to strings which pass over pulleys fixed to the edge of the table. If the table is not circular, the pulleys must be mounted on rods which can rotate in sockets clamped to the table. It is obvious that the pulley must be free to follow the direction of the string. The students grasp at once the fact that at least two forces are required to keep the card in equilibrium. By marking the direction of the strings and noting the weights, it will be found that the conditions of equilibrium are that the forces must be equal and opposite, acting in the same straight line.

The application of another force leads to the condition that the forces meet in a point, and furnishes the basis for the inference of the parallelogram law. From that point the treatment is the same as in Section XVII. It should be obvious that four or more forces can be applied to the card, and the polygon of forces inferred in the same way.

The triangle of forces should be used to solve some simple problems, but it should not, in the writer's opinion and with all deference to examining bodies and writers of text-books, be applied at this stage to the inclined plane. The discussion of work done in moving up an inclined plane is simple and of practical value. The statics of the inclined plane is of no particular value, and it is rather hard. The case of a force applied parallel to the base of a plane, which is common enough in text-books, need, at all events, only be referred to as a warning against the foolishness of wasting strength against solid earth.

If Section XII. has not been omitted, the exercise (see *Supplement*) will provide excellent practice in elementary trigonometry.

EDWIN OF DEIRA.

HISTORICAL PLAY FOR SCHOOLS IN FOUR SCENES.

BY J. EDWARD PARROTT, M.A., LL.D.

(*Author of "Pageant of British History," "Britain Overseas," etc.*)

CHARACTERS IN THE PLAY.

EDWIN, exiled Prince of Deira.
REDWALD, King of East Anglia.
RAINER, his son and heir.
PAULINUS, a Christian missionary.
QUEEN, Redwald's wife.
Nobles of Northumbria, First Thane, Second Thane, Ladies, Warriors of East Anglia, Hus-carles, Glee-man, Glee-maiden, etc.

Period, A.D. 617.

Scene I.—Banqueting Hall in Redwald's Palace.
Scene II.—Outside the gate of Redwald's Palace.
Seene III.—Chamber in Redwald's Palace.
Scene IV.—The same.

The legend here dramatised is taken from Bede's *Ecclesiastical History of the English Nation.*

Scene I.—Banqueting Hall in the Palace of Redwald, King of East Anglia.

At a high table sit feasting REDWALD, *his* QUEEN, nobles, *and* ladies. *A* Glee-man *sings to the harp. At conclusion of song—*

Redwald. Thou pipest merrily. *Waes hael! Waes hael!* [*Drinks.*]
A right good song, and right well sung, say I.
[*A knocking heard at the gate.*
[*To a Hus-carle.*] Go, see who thus disturbs our revelry.
[*Exit Hus-carle.*

Queen. Some wayfarer, perchance, who in the maze
Of these our fens hath lost the devious path,
And, tricked by Jack a Lantern in the gloom,
Hath wandered pixy-led in oozy ways.
Right thankful will he be to rest his limbs
Before our ruddy hearth, and cheer his heart
With creature comforts and good fellowship.

Re-enter Hus-ca·le.

Hus-carle. A stranger, sire, seeks audience of thee,
Asking thy pardon that he should arrive
At such untimely hour.
Red. What man is he?
Hus-carle. I know not, sire. He seemeth travel-spent,
Ragged and miry, yet no common man.
His speech and port belie his mean attire.
Methinks, a princely youth bowed down with care.
Red. Admit him. Prince or churl, æthling or serf,
I will not turn him from my door to-night.

Exit Hus-carle, *and re-enter with* EDWIN, *who bows low to the* QUEEN *and* KING.

Edwin. Greeting, King Redwald, and to thee, fair Queen.
I humbly crave your royal clemency.
What man I am and what my grievous plight,
What boon I ask, and why I ask it thus,
I shall recount to your own private ear.
Red. Nay, let thy business wait. Sit here, I pray,
And re-create thyself with meat and drink.
Not till thy hunger is assuaged will I
Give heed unto thy converse. Sit and eat.
Ed. Thy pardon, sire. No food shall pass my lips
Beneath this roof-tree till my name and state
Are known to thee. I am a dangerous guest,
That pays his host for welcome with a snare.
When thou shalt learn who craves thy kingly aid,
It may be thou wilt say, "Go, get thee gone!"

Red. Thou art mysterious, but have thy way.
Give up thy weapon. [*Edwin gives up his sword to an attendant.*] Good my lord and friends,
Pray you depart and leave us here alone.
[*Exit all but Redwald, Queen, and Edwin.*

Queen [*who has been gazing earnestly on Edwin*].
I know thee. Thou art Edwin, Ella's son.
[*Takes his hands in hers.*
Welcome! Thrice welcome! Dear thou art to me
As mine own child. Thy mother was my friend,
My true and loving friend, as maid and wife.
Oft have these arms held thee in sweet embrace
When thou wert but a nursling in thy cot.
That was long time ago. Now thou hast grown
To manhood, yet I know those eyes of thine,
Thy mother's eyes—calm, fearless, tender, true.

Ed. Dear Queen, thou speakest sooth. I am the son
Of Ella, he who once Deira ruled,
A king of grace and true nobility.
Thou know'st his story—how that Ethelfrith
Slew him in battle, and his kingdom fell
A prey to that usurper's bloodstained sword.
Then was my infant life in danger sore,
For Ethelfrith, by all his gods, had sworn
To extirpate Deira's kingly line.
My foster-father, Lilla, bore me off
To the wild hills of Wales, and there he sought
The noble-hearted Cadvan, Cambria's king.
"I bring you here," quoth he, "a royal babe,
An orphaned prince that needs a father's care.
His sire hath met thee oft in gory fray
And humbled thee on many a stricken field.
Now he is dead, slain by Northumbria's king;
His kingdom is no more. This is his son,
Deira's heir, the last of Ella's line.
O noble foe, be thou a noble friend;
Take, guard, and nourish this frail, infant life,
And mercy's crown shall be for ever thine."
So Lilla spake; and Cadvan straightway swore
To be my guardian, father, life-long friend.
All this he was, and more.

Red. But tell me, pray,
Why hast thou left his court? Why comest thou
From that strong refuge to this dangerous bourn?

Ed. Two years ago good Cadvan passed away.
A graceless son sits in his seat, and he,
Moved by the threats and bribes of Ethelfrith,
Hath thrust me forth, a homeless wanderer.
Hither and thither, like a fleeting cloud,
Blown by the wind of stern necessity,
Have I sought vainly for a resting-place.
Now Ethelfrith pursues me night and day;
I go in peril every single hour.
Despair gnaws at my heart. The last resort,
I come to thee, Bretwalda of this land,
And crave thy succour. If thou say me nay—
As well thou mayest, knowing friendship's price—
I'll hie me to mine enemy. His sword
Shall cut the thread of this my thin-spun life
And give me rest, an everlasting sleep.

Queen. Poor wanderer! thy haven's reached at last;
The harbour lights gleam on thy storm-tossed bark.
Here shalt thou rest secure from every foe.
Redwald will shelter thee, and not a dog
Shall dare to bay thee. Good my lord and king,
Speak I not for thee? Thou shalt be to him
Protector, guardian, father, lifelong friend.

Red. It shall be so. Justice and mercy plead
His cause with me. I pledge my kingly faith
To guard and comfort him and serve him well.
So good-bye care, a long farewell to sorrow,
A brighter, happier day shall dawn to-morrow.
Curtain.

Scene II.—Outside the Gate of Redwald's Palace three days later, towards sunset.

Enter REDWALD (*soliloquises*).

Ill news doth ever travel fast and far.
Three days ago came Edwin to my court
Seeking that succour which I gladly gave.
Last night an envoy from fierce Ethelfrith
Came spurring here to me. "Slay me my foe"—
Thus ran his message—"slay me Edwin straight
And win my gratitude. To thee I'll give
Riches of gold and silver, jewels rare,
If thou wilt rid me of mine enemy."
"Avaunt, base tempter!"—thus I answer made.
"Were all the gold of earth my recompense,
I would not do so foul a deed of shame."

Enter First Thane.

Thane. O King, ere thou hadst left thy couch this morn
A second envoy from King Ethelfrith
Knocked at thy gate.

Red. With what intent, O Thane?

Thane. To bring this message from his lord and king—
"Slay but the viper crawling in my path,
And I will give thee lands as well as gold."

Red. Bid him go whence he came. Not for the realm
Of earth itself would I my guest betray.
[*Exit Thane.*

Enter Second Thane.

2nd Thane. O King, ambassadors from Ethelfrith
Await thy pleasure, craving audience.

Red. Admit them to our presence instantly.
[*Exit Thane.*

Enter three Northumbrian Princes.

Chief of the Embassy. Greeting, O Redwald, from our lord and king!
Thus speaks he by my mouth: "Bethink thee well
How thou refusest this, my last request.
Slay Edwin, or if thou preferrest it,
Yield him to these my trusted friends. Do this,
And princely gifts shall throng thy treasure-house.
Refuse mine offer, and forthwith I lead
Northumbria's army 'gainst thee. Call to mind
How I laid low the Welsh at Chester's gate,
How Aedhan's mighty host at Dægsa's stone
I slew, and in a day broke Scotland's power.
Bethink thee, can thy feeble arms prevail
Against my veterans? Be wise, O King,
Stake not thy kingdom on this outcast's head.
I wait thy answer. Is it peace or war?"

Red. How shall I answer thee? Thy master's might
I know full well. Lo! I am torn in twain.
If I forswear my oath to this young prince
I blacken my fair fame with foul disgrace.
If I fulfil my oath, then Ethelfrith
Will carry fire and sword thro' Angle-land,
And glut his wrath in streams of guiltless blood.
I know not which to choose. O give me time.
Tarry ye with me till the morrow's morn;
Sup at my table while I ponder well
Which path to tread.

Chief. We wait thy pleasure, sire.
[*Exit Embassy and Redwald.*

2nd Thane. Sure, Edwin's fate hangs on a single thread.
I love him well, and I would venture much
To save him from the wrath of Ethelfrith.
[*Taps at a window.*
Edwin, come forth, I fain would speak with thee.

Enter EDWIN.

Ed. How now, good thane?
Thane. O Edwin, thou must flee.
Ambassadors from Ethelfrith are here.
They have o'erborne the King with threatenings
Of war unless he yields thee to thy foe.
Come, haste with me! I will bestow thee safe
Within a hiding-place where thou mayst lurk
In safety till this storm be overpast.
Ed. Good thane, I thank thee, but I will not flee.
Weary of life am I. Cursed by the gods,
I bring a curse on every friendly soul
That shelters me. Good thane, I will not flee.
Redwald has sworn to succour me, and I
Will trust him to the end, whate'er it be.
Let Redwald slay me if he will. Better
The stroke from him than from a meaner man.
Thane. Nay, prince, if thou wilt hide thyself a space
Thou shalt do Redwald service. He has sworn
To shelter thee, and if he keep his oath
Right speedily the fierce Northumbrian wolves
Will ravage this fair fold. Give heed, I pray.
The smoke of burning roof-trees will ascend;
The land will reek of blood; the infant's wail,
The mother's anguished cry, the strong man's groan
Will be the requiem of Angle-land.
If thou go hence of thy free will and hide,
Redwald breaks not his plighted word to thee,
And Ethelfrith hath not a cause of war.
Ed. I will not fly. For two long, weary years
Have I been hunted by my cruel foe;
In mountain caves or deep within the woods
I've lurked the months away. Like that White Christ
Whom strangers preach, I've wandered to and fro,
And have nowhere to lay my weary head.
Unceasing is the chase. On, on I speed,
The shout of huntsman and the bay of hounds
Ring ever in mine ear. Here shall it end.
Here shall the quarry fall, the hunt be o'er.
Here given the blow of grace! One short, sharp pang,
And then the long, sweet, dreamless sleep of death.
Thane. Hopeless it is to shake thy fixed mind.
I'll leave thee, hoping still 'gainst hope
That Redwald may resist the tempter's wiles.
[*Exit Thane.*

EDWIN *sits on a stone in an attitude of despair. Enter* PAULINUS, *a white-bearded old man, clad in a white robe.* (*The stage is darkened.*)

Paul. This is the hour of rest. Why sitt'st thou here,
Exposed to wind and rain, while humbler men
In cot and hall slumber the hours away?
Ed. What is't to thee? May I not please myself,
And watch or sleep as seemeth best to me?
Paul. O palter not with me. I know thee, prince.
I know thy sorrows and thy weight of woe.
Thou fearest instant death; thou waitest here
The coming of thy foes. I know it well.
Give heed to what I say. Suppose a man
Should here and now deliver thee from death,
Should work on Redwald's mind till he grew staunch
As this unflinching rock—suppose, I say,
New life and hope this stranger brought to thee—
What wouldst thou give him as a recompense?
Ed. All, all I have, and lifelong gratitude.
I'd be his debtor till the end of time.
Paul. Think what thou sayest. If I promise thee
That thou shalt overcome thine enemies,
And sit in power upon a kingly throne
More glorious than thy sires' of old renown,
What wilt thou do for me?
Ed. I will obey
Thy word in all things. Thou shalt be to me
A cherished father; I, thy loving son.
Paul. Thy word is pledged. Ere two short moons shall pass
Thou shalt in conquest crush thy mortal foe
And sit again upon thy father's throne.
Then shall I come to thee and claim my due.
I shall not ask for gold, or lands, or power,
But I shall strive to do thy soul great good,
To lead thee to a better, nobler life,
To point salvation's way to thee and thine.
Then thou shalt list, and learn, and aid me well
In these endeavours. Is it so, my son?
Ed. Ay, verily. I will believe and trust,
And will obey in all things. This I swear
By Odin and by Thor, my sacred gods.
Paul. [*Placing his hand on Edwin's head*] When once again in days of victory
I lay my aged hand upon thy head,
Wilt thou remember this long night of pain,
Our converse, and thy pledge? Wilt thou then
Delay not to perform thy promises?
Ed. I will remember.
Paul. Fare thee well, my son. [*Exit Paulinus.*
Edwin. [*Starting up*] Father, but one word more. Alas! he's gone.
No mortal he—a spirit from the gods
To bid me live and strive and hope again.
I feel, I know, a better day draws nigh.
Out of the darkness light hath dawned on me.
My heart springs up; the blood bounds in my veins.
The sunrise gilds the hills; 'tis promise fair
Of all that Edwin shall contrive and dare.

Curtain.

(*To be concluded next month.*)

OUR SUPPLEMENT.

SPECIAL NOTICE.

The Supplement given with this month's issue can be obtained separately by those Evening School Teachers who wish to procure copies for Students' use.

The price is Threepence per copy, or Two Shillings and Sixpence per dozen, Post Free in either case.

Application must be made direct to the Office of the PRACTICAL TEACHER, and Remittance must accompany each order.

AGRICULTURAL EDUCATION.

A SCHEME OF WORK FOR RURAL SCHOOLS.

BY W. FRANCIS RANKINE.

General. — Many interesting subjects present themselves during the month, and on account of their heterogeneous nature the rural teacher will experience some difficulty in preserving the perspective of his scheme. In early districts root crops are maturing, and the storage of these should be observed. Their use, comparative food values, and composition provide interesting material for many a lesson. Where autumn-sown wheat is to be put in, the plough will be at work; and here is emphasised an important operation in soil improvement. Careful and scientific soil culture is of the first importance in agriculture; the work illustrates effectively how physical forces are aided by manual operations. In the animal world there are many subjects for observation, and premier amongst these in utility, intelligence, and beauty is the draught horse.

Soil Study.

1. *Classification of Soils.*—The classification of soils may be decided according to colour, texture, or plant-food content. Usually, for practical purposes, texture is the basis of distinction, yet the colour differences so often met with are valuable indications of the source of soils. The nature of all soils—except peat soils, which are formed entirely from decayed vegetable substances—is directly determined by the character of the rock below the surface; where geological conditions change, soil character alters also. It must, however, be carefully noted that soil facies change as cultivation proceeds. Where it is possible, a series of observations should be recorded in order to emphasise differences in properties and their causes. In the school garden particularly this work provides valuable instruction.

For ordinary class work in which pronounced agricultural teaching is not necessary, it is sufficient to adopt the following scheme of classification with regard to soils:—(1) Light soils—sands; (2) medium soils—loams; (3) heavy soils—clays. With such a scheme it is possible to allocate to each type of soil a position in the table. It is of interest to notice that the words "light" and "heavy" carry meanings distinct from their general usage. They refer exclusively to the attitude of soils with regard to cultural processes. Thus light soils are easily moved, and heavy soils are cultivated with difficulty.

The textural nature of the soil having been determined, it is now possible to extend the study. The relation of each type towards water should be noted. Then the food content of each should be observed, and ultimately an effort should be made to determine the particular conditions which each provides for plant development. The latter observation may be decided by noting the distribution of wild plants. Such work lends itself particularly well to the school journey, in which changes of vegetation may be traced to changes in soil.

2. *Formation of Soils.*—The actual formation of soil is well illustrated in a section such as is shown in a quarry or railway cutting. Near the surface it is possible to determine three zones—namely, (*a*) the soil proper, (*b*) the subsoil, (*c*) the parent rock. It will be seen that no distinct line of demarcation is presented; each zone shades imperceptibly into the other. In the subsoil there may be fragments of broken rocks of the same nature as those below; these indicate the weathering process or breaking up of the rock in the production of soil. That the process is a lengthy one is evident, varying, as it does, with the durability of the rock. On account of this fact it is not easy to provide much experimental demonstration of the physical operations that take place in soil formation. The following notes are suggestive:—

(*a*) *The Effect of Frost on Rocks.*—The action of frost in breaking down rocks is well shown in limestone quarries in winter. Rain enters the numerous crevices, and in freezing forces the rocks apart. This same action may also be noticed when a lime dressing is placed on a pasture—the fragments are broken down into powder. In quarries it is noticed that tiny chips are forced off by frost and collect in small heaps at the base of the exposure.

(*b*) *The Action of Water.*—Apart from the force exerted by water during freezing, rain-water acts as a solvent, and thus hastens decomposition. Finally, it transports material in suspension as well as in solution, and produces alluvial soils.

(*c*) *The Action of Oxygen on Rocks.*—The formation of oxides is of primary importance in the breaking up of rocks. The process is identical with the rusting of iron, and it is accelerated by the presence of moisture. The complex nature of the majority of the mineral constituent of rocks renders it impossible to enter into the detail of these chemical changes.

The decomposition of granite is a very interesting instance of weathering, and presents itself to the teacher as a typical example. Its characteristic constituent minerals are felspar, quartz, and mica; other minerals, such as magnetite, may be present in small quantities. The felspar is the first to decompose, and the mica and quartz crystals are set free. The former passes into clay, and in the course of time the quartz is worn down by water action into small grains that form sands. In many sands, even in those of the Tertiary rocks, mica is to be found; and these tiny plates are relics of the crumbled granites of the oldest formations. Thus granite yields, in its decomposition, sand and clay, and a mixture of these in equal quantities gives a loam.

The Draught Horse.

The draught horse, or cart horse, provides one of the most interesting studies on the farm. Too frequently the horse, as a lesson subject, is handled in a casual way simply as a specimen of a quadruped, while it presents a splendid example of evolution.

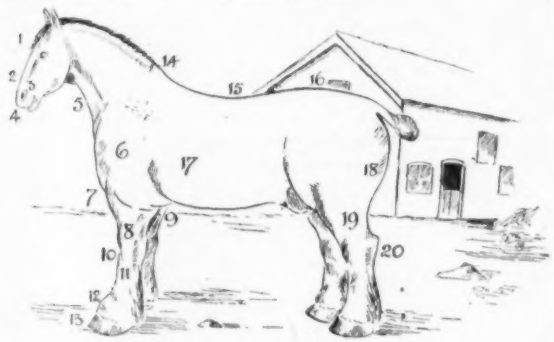
1. *The Evolution of the Horse.*—The horse is one of the Ungulates or hoofed animals. Other familiar types are the ass and the hybrid or mule. The quagga and zebra also belong to this family. Geological records prove that these creatures—or, more correctly, their ancestral representatives—were originally three-toed. In their wild state they inhabited open plains and prairies, and for the security of the race developed the senses of smell, sight, and hearing to a very high degree. Rapidity in movement enabled them to escape natural enemies. The hoofs are especially well adapted for galloping over hard, dry ground. The teeth are suited for grazing, and incidentally, in comparison with fossil forms, indicate that incisor teeth have developed into molars.

The nostrils of the horse are dilatable, and thus in respiration the amount of air inhaled can be regulated. This is a feature peculiar to the horse; it never uses its mouth as an auxiliary in breathing. Above the

nostrils, placed in cavities, are the false nostrils which apparently aid respiration.

2. *The Points of a Draught Horse.*—The history of the draught horse is an interesting chapter in the evolution of muscularity at the expense of speed. There are many types of these splendid animals, and each is more or less confined to certain districts. Clydesdales, Shires, and Suffolks are the leading breeds of the draught horse, and each is typical of its essential characteristics. Photographs of these should be obtained, and preserved for reference.

The utility of these horses lies in the enormous strength of their shoulders and quarters, firmness of leg, and flexibility of the pasterns (the bones which lie immediately above the hoof). The hocks also are very important points, and are capable of bearing enormous strain when the horse is pulling; their clear definition indicates great strength. The mechanics of horse power can only be demonstrated by seeing a horse in motion. The main forces are—(*a*) the forward moving force of the shoulders; (*b*) the leverage of the leg muscles, aided by the elasticity of the pasterns; and (*c*) the strain thrown on the hocks. The last is clearly evident when a horse is pulling uphill.



THE POINTS OF A DRAUGHT HORSE.

1. Forehead. 2. Face. 3. Nostril. 4. Muzzle. 5. Neck. 6. Shoulder. 7. Breast. 8. Arm. 9. Elbow. 10. Knee. 11. Cannon bone. 12. Pastern. 13. Foot. 14. Withers. 15. Back. 16. Loin. 17. Girth. 18. Quarters. 19. Gaskins. 20. Hock.

The main points of the draught horse are as follows:—

(1.) Large nostrils are looked for, since these indicate great breathing capacity; and this is of primary importance in the case of a large horse.

(2.) Well-formed shoulders are essential, and the posterior muscles must be wide and deeply set.

(3.) The breast should be muscular and wide.

(4.) The pasterns should be sloping, and when they are well formed give rise to graceful motion.

(5.) The withers should be high and slope well down to the back.

(6.) The quarters should show great muscular development.

The arrangement of harness secures the most comfortable conditions for working. The forward pull is thrown upon the collar, which is constructed to fit over the shoulders and withers. The trace chains are fixed to the hames on the collar, and place the line of motion through the most muscular part of the shoulders. The weight of the load is thrown on to the back of the horse, where the pad is fixed. In the case of the leading horse, or chain horse, no pad is used, since no weight is thrown on its back.

OUR COOKERY COLUMN.

BY ROSAMOND CANDY, FIRST-CLASS DIPLOMÉE, NORTHERN COUNTIES SCHOOL OF COOKERY.

NOW that the winter evenings are fast approaching, we turn our thoughts to pleasant indoor entertaining in the form of musical evenings, whist drives, etc. The hostess is often puzzled with regard to the refreshments on such an occasion, which she merely wishes to be of a light nature.

The following list may be helpful in forming a "supper menu," where in each case the various dishes are prepared beforehand, and may be all in readiness and easily served from a side table.

Sandwiches.—Ham and tongue, egg flip, tomato and cucumber. *Patties.*—Veal and ham, sausage rolls. *Creams.*—Ginger cream, Charlotte Russe, and velvet cream. *Jellies.*—Lemon jellies, orange surprises, and lemon sponge. *Trifle.*—Royal trifle. Méringues, cream baskets, and assorted cakes and biscuits. *Fruit.*—Grapes, oranges, bananas, and apples. *Sweets.*—Chocolates and creams. *Drinks.*—Tea, coffee, chocolate, claret cup, and lemonade.

Sandwiches are often so carelessly made that they look anything but appetising. The meat used should be well cooked, and all skin, gristle, and unpalatable portions removed. The bread should be cut thinly and buttered lightly with fresh butter, and all crusts cut away. If the sandwiches are not wanted immediately, lay a cloth wrung out of cold water upon them to keep them moist.

To make Ham and Tongue Sandwiches.—Pass the ham and tongue through a mincing-machine. Butter the rounds of bread slightly, and place the minced meat on the one piece, covering with the other. Season with mustard. Remove the crusts, and cut into small, dainty sandwiches of various shapes. Place on a lace d'oyly or folded serviette, and decorate *lightly* with parsley, endive, or watercress. Chicken may also be used, or any cooked meats.

Egg-Flip Sandwiches.—Hard boil two or three eggs. Remove the shell, and chop up the yolks and whites together. Add a tablespoonful of cream and a little salt and pepper. Make into sandwiches as above.

Tomato and Cucumber Sandwiches are made by slicing thinly the tomato or cucumber. These sandwiches should *not* be prepared too long before they are required, as they deteriorate with standing.

Patties or Sausage Rolls.—Prepare some good flaky pastry (see April number), and make the patties by cutting the pastry in small rounds, placing a little cooked veal and ham previously minced on one round and covering with another. Bake quickly twenty minutes. Sausage rolls are made in the same manner by cutting the pastry into long *strips*, and placing the sausage meat on the one side and covering with the other strip of pastry.

HINTS ON THE MAKING OF CREAMS, JELLIES, ETC.

Of all departments of cookery, there is probably no other which lends itself more to the artistic powers of a cook than under the general heading of "Sweets." Creams have very often elaborate titles, but jellies are generally known by the predominating flavouring used. When making creams—1. Always use "double cream," or cream which has stood for twenty-four hours on the milk before skimming. 2. Always whisk cream in a cool place until it clings to the whisk. Care must be taken not to overbeat the cream, the result being

churned cream. 3. In adding the gelatine or custard to cream, it should be first cooled and stirred in very lightly. 4. Leaf gelatine is the best to use, and most convenient. Only enough should be used to enable the jelly to stand without being too stiff—one half-ounce to a pint. 5. Copper or tin moulds are most satisfactory for moulding creams and jellies. 6. To prepare a mould for creams and jellies, simply dip it in cold water. 7. To remove a cream or jelly from a mould, dip the mould in hot water for a few seconds and turn out quickly.

Ginger Cream. *Ingredients.*—Yolks of two eggs, one ounce castor sugar, one gill milk, half-gill ginger syrup, half-pint double cream, two ounces preserved ginger, three-quarter ounce gelatine. *Method.*—Make a custard of the eggs, milk, and sugar, and when cool add the syrup and preserved ginger cut into small dice; add also the gelatine dissolved in two tablespoonfuls of water; then carefully add the whipped cream. Mix all together, and place in wetted mould. Allow to set, and turn out when required. Decorate with a little chopped jelly.

Velvet Cream. *Ingredients.*—Three eggs, half-pint milk, half-pint double cream, one ounce gelatine, one tablespoonful sugar, half-teaspoonful essence vanilla, jelly, and pistachio nuts. *Method.*—Melt some lemon jelly and prepare the pistachio nuts. Place these at the bottom of a wetted mould, and pour in some jelly to cover the mould about half an inch. Allow this to set. Prepare the custard with the eggs, milk, and sugar, and when cold stir in the gelatine, previously dissolved in two tablespoonfuls of water. Add the whipped cream very carefully and the flavouring. Pour into mould, and allow to set.

N.B.—Another way to serve up this cream is to set the mixture into small cups instead of one big one.

Charlotte Russe. *Ingredients.*—Two ounces Savoy biscuits, half-pint thick cream, one and a half ounces sugar, half-ounce leaf gelatine dissolved in two tablespoonfuls water, flavouring, a little jelly for decorating mould. *Method.*—Prepare the mould by pouring in the jelly to about an inch at the bottom. Allow this to set. (Preserved fruits may also be arranged at the bottom with the jelly.) Arrange round the sides of the mould the Savoy biscuits, which must be divided, and place the *flat* side to the cream. Dissolve the gelatine in the water, and when cooling stir this into the whipped cream. Also add the sugar and flavouring. Place this in the middle of mould, and allow to set.

Lemon Jelly. *Ingredients.*—Half-dozen juicy lemons, three-quarter pound loaf sugar, two ounces leaf gelatine, two pints water, one and a half inches stick cinnamon, one clove, whites and shells of three eggs. *Method.*—Place water, sugar, gelatine, lemon juice and rind—pared finely also—clove, and cinnamon into a bright saucepan. Whisk over fire until the gelatine is all dissolved. Beat up the whites stiffly and break the shells. Whisk again until it reaches boiling-point. Draw pan to one side, and cover for ten minutes. Strain through a cloth; then fill the moulds, and allow to set.

N.B.—The first jelly to run through the cloth may not be very clear. Return it to the cloth again, and wait until it does clear.

To vary these jellies, fruits may be added to the moulds, such as bananas cut in rounds and oranges quartered and skinned, or pistachio nuts chopped. The fruit should be carefully arranged in the moulds in layers and the jelly added alternately, each layer of jelly being set before more fruit is put in.

Lemon Sponge.—Lemon sponge is made by whisking the whites of two eggs with half a pint of lemon jelly until the whole is frothy and white. Pile the mixture in a glass dish, and decorate with cherries and spikes of angelica.

Orange Surprises. *Ingredients.*—Three or four oranges, one pint jelly. *Method.*—Cut a small round from the top of each orange and remove the centre. Pour in some water to wet the sides, and then remove this. Next pour in the jelly, half filling the cases; then add a little carmine or cochineal to the remainder of the jelly, and fill up the oranges when the other half is set. Replace the round. Cut in quarters when quite set, and serve on glass dish.

Royal Trifle. *Ingredients and Method.*—Wet a mould. Cut up three or four stale sponge-cakes; spread with apricot jam and place in the mould. Add also some ratifia biscuits; pour over these a little sherry or brandy. Have ready about half-pint lemon jelly, and when beginning to set pour this into the mould with the sponge-cake. When quite set, remove from mould and stick over with blanched almonds. Pour over this half-pint custard, and decorate with whipped cream (using a cream forcer) and preserved cherries and angelica.

Cream Baskets.—Cream baskets are really miniature trifles, and form an exceedingly dainty dish. *Method.*—Cut out some small rounds of sponge-cake, and hollow out the centres. Heat some apricot jam, and smear the sides and top of these rounds with the jam; then dip them into some chopped pistachio nuts. Place a little jam in the bottom of the round; force some cream on the top of this, and place a strip of angelica over the top to form a handle.

N.B.—The angelica should be placed in boiling water for a few minutes to make it pliable, otherwise the handles will break in bending it round.

Méringues are given in the February number of this paper. For assorted cakes, etc., see the May number on "Cake-making." Claret cup and lemonade are given in the July number.

How to Cook a Husband.

Extract from very old Recipe Book—1840 A.D.

"As Mrs. Glass said of the hare, you must first catch him. Having done so, the mode of cooking him is as follows:—Many good husbands are spoiled in the cooking. Some women go about it as if their husbands were bladders, and are constantly blowing them up; others keep them constantly in hot water; while others freeze them by conjugal coldness. Some smother them in hatred, contention, and variance, and some keep them in pickle all their lives. These women always serve them up with tongue sauce. Now it cannot be supposed that husbands will be tender and good if managed in this way.

"But they are, on the contrary, very delicious when managed as follows:—Get a large jar called the jar of carefulness (which all good wives have on hand); place your husband in it, and set him near the fire of conjugal love. Cover him over with affection, kindness, and subjection; garnish with modest becoming, familiarity, and the spice of pleasantry; and if you add kisses and other confectionaries, let them be accompanied with a sufficient portion of secrecy, mixed with prudence and moderation. We would advise all good wives to try this recipe and realise how admirable a dish a husband is when properly cooked."

Our Readers' Column.

STUDIES OF BOOKS THAT ARE WORTH WHILE.

BY SUSAN CUNNINGTON.

VI.—The Poetry of Matthew Arnold (1822–1884).

"My poems represent, on the whole, the main movements of mind of the last quarter of a century, and thus they will probably have their day as people become conscious to themselves of what that movement of mind is, and interested in the literary productions which reflect it."—*On appearance of "Poems," 2 vols.* (1869).

MATTHEW ARNOLD'S anticipation, framed forty years ago, has undoubtedly been fulfilled, and the band of lovers of his poetry, which was small during his lifetime, has grown steadily in numbers and in devotion until the present time. A noticeable point about them is that they are not, as a rule, primarily students of mind-movements, but are drawn to the poems of this thinker by a subtle undercurrent of sympathy. Many of the lovers of his poetry are those to whom poetry does not invariably make appeal—those, indeed, who have found no message for themselves in any other modern poet.

Like his great contemporary, Alfred Tennyson, Arnold was at once the product and the expression of the Victorian Age. From the circumstances of his life we should expect him to be representative of certain currents of thought and life in the nineteenth century, and alien from, if not hostile to, many others. A boy at Rugby during part of the *régime* which began the revision of our established educational theories, Balliol Scholar and Fellow of Oriel during some of the most brilliant years of Oxford scholarship, Rugby master when the eyes of all were upon that famous school, and in 1851 appointed Inspector of Schools, Matthew Arnold was bound to represent phases of thought unknown to the large number of his less privileged contemporaries.

His sympathies are thus chiefly intellectual: his kinship with the classical writers is as true and real as that of Tennyson, his isolation from the pressure of political and social endeavour as complete; his deliberate espousal of the things of the mind sustained and unwavering. Partly through instinct and partly through persistent cultivation, it was to him a matter of pre-eminent importance to know and to care for the best in thought. Whilst repudiating certain established forms of the Christian faith, he exemplified its sternest declaration as to the value of thinking rightly, and so trained and disciplined his literary and æsthetic taste that he might never admire or esteem the second-rate. This sincere and reasoned devotion to the best gave such strength and temper to his poetry that in these lies the secret of its appeal to minds widely separated from his own in range and equipment.

Those who first approach the study of Matthew Arnold fresh from the melody and colour and glow of Tennyson will at first be conscious of a certain coldness and austerity of manner and a stern frugality of matter. But the quiet, restrained fervour, the intense feeling, the high even level of delicately finished expression, the grave benignity of expression, soon arrest and hold the attention of the reader. The *Golden Treasury* volume of selections from his poetry, which he himself prepared in 1878, contains most of the sonnets and lyrics for which he is best remembered. The first sonnet in the "Early Poems" strikes the keynote of his song—strong and unwavering resignation, with no strain of mutiny or revolt, yet with only the sombre joy of being in harmony with the great, inscrutable purpose of life. It is called "Quiet Work," and though wanting in the immediately stirring effect of some poetic methods of presenting endeavour, is full of inspiring suggestion, with something of Wordsworth's outlook. Better known is his "Shakespeare" apostrophe, with its fine suddenness of opening—

> "Others abide our question. Thou art free—"

and its vigorously expressed satisfaction at the tardy fame which came to surround his name. In the same division, "Early Poems," is one of the few which have any reference to the public affairs of the time—"To a Republican Friend, 1848"—and in it may be clearly discerned the absence of confident enthusiasm which distinguished the poet. He protests that not pride but patience is the result of musing upon "what life is"—

> "Seeing this vale, this earth, whereon we dream,
> Is on all sides o'ershadowed by the high
> Uno'erleaped mountains of Necessity."

Arnold's favourite theme of self-contained acquiescence with life could beget a sense of resistance in the young student of his poetry, were it not that his sympathy with this attitude is evident and sincere. It is his own candid protest in "Youth and Calm" that "youth dreams a bliss on this side death," and he had heard and known the voice that tells "calm's not life's crown, though calm is well." We are often reminded of Wordsworth in the reflective poems of Arnold, and this is the case in the profoundly moving one, "To a Gipsy Child by the Seashore." So also in some of the later sonnets, in which one single thought is beautifully enshrined and developed. The dictum of the stern emperor-sage, Marcus Aurelius, "Even in a palace life may be led well!" is the opening line of one which reaches its climax in the declaration so characteristic of Arnold's thought, "The aids to noble life are all within." In the sonnet "East London" his few clear-cut sentences show us the contrast between the unlovely external conditions and the abode of the spirit—without, the squalid streets; within, the peace of heaven.

> "'Bravely!' said he; 'for I of late have been
> Much cheered with thoughts of Christ, *the living bread*.'"

Another contrast is beautifully described in "The Good Shepherd with the Kid"—the dogma of the great churchman, "He saves the sheep, the goats He doth not save," and the rude art of the Christian Church in the Catacombs, where the Kid is substituted for the Lamb.

The polished delicacy of Arnold's verse is admirably shown in his "Narrative Poems." Of these the *Golden Treasury* selection contains "Sohrab and Rustum," "Tristram and Iseult," "Saint Brandan," "The Neckan," and "The Forsaken Merman." The last-

named is the best known, and is a daring and original inversion of the orthodox tradition of the children of the sea and of the earth. The mortal woman who had at some time wedded the merman and made her home in the "kind sea-caves" returns to earth, called by the Easter bells, and leaves "lonely for ever the kings of the sea." In "Saint Brandan" is a melodious rendering of one of the many legends of this northern saint. "Tristram and Iseult" is in the romantic regions of the King Arthur legends, and "Sohrab and Rustum" gives a fragment from the ancient Persian epic. This was written in 1853, and Arnold had great pleasure in its composition. "I took much pains to Orientalise," he wrote to a friend; and the description of the marshalling of the opposing hosts, and of the mighty contest between the father and son, has in it something of the Miltonic ring and energy. His phrasing is short, clear, decisive, with nothing of parentheses or involved construction, but in the forcible march of the rhythm and the welding of thought and metre it recalls Milton's blank verse.

Following Arnold's own classification of his poetry, we come next to his lyric poems. The group under the heading Switzerland is characteristic of his pensive thought and finely chiselled expression. His sustained analogy of the isolation of the individual soul and the islands washed by the shoreless tides of ocean is striking. A similar note of sadness is in "Absence," that

> "Each day brings its petty dust
> Our soon-choked souls to fill;
> And we forget because we must,
> And not because we will;"

while the inevitable and irrevocable failure of human intercourse and friendship is emphasised even more strongly in the final lyric, "The Terrace at Berne":—

> "Like driftwood spars, which meet and pass
> Upon the boundless ocean plain,
> So on the sea of life, alas,
> Man meets man—meets, and quits again."

The stern sobriety of Arnold's muse is exemplified in the short poems, "Self-Dependence" and "Morality," the secret strength and fervour of a life lived in conscious harmony with Nature and the great purpose of the universe being suggested in the one, and the stability of character which ensues in the other. The couplet closing the first stanza is deservedly known, and epitomises the whole—that

> "Tasks in hours of insight willed
> Can be through hours of gloom fulfilled."

Amongst the "Elegiac Poems" are two which are always read and studied with pleasure—"Thyrsis: a Monody," in which Arnold commemorates his friend Arthur Hugh Clough; and "Rugby Chapel," a sober panegyric on his father, the great headmaster. "Thyrsis" reminds us rather of Milton's "Lycidas" than of Shelley's "Adonais" or Tennyson's "In Memoriam," and ranks worthily with those great dirges. It is a device of the poet to connect with Clough the "scholar-gipsy" of the seventeenth century of whom Glanvil wrote; and the unconventional and original manner of life of his fellow-poet justifies the connection. "Thyrsis" is framed on classical models, and, as in "Lycidas," we find the simple, friendly charm of English scenery interwoven with the old Greek myths and legends which poetic tradition hands on down the line of poets.

Very different in structure and tone is "Rugby Chapel," packed with troubled thought in closely marshalled, detached phrases, yet with a ringing undertone of resolute quality which moves and inspires to achievement and endurance. The metre is striking and singularly easy to remember with its austere rhythm of unrhymed lines. In the "Memorial Verses" Arnold pays the homage of a disciple to his master and exemplar, Wordsworth, with whose philosophic turn of thought he had real affinity.

It is true that Matthew Arnold was never a "popular" poet, nor is it likely that his poetry will ever become generally admired. It is too scholarly, its tone too cold and aloof, its subject-matter and treatment usually somewhat removed from the ordinary conceptions of the function of poetry, and never condescending to be merely pretty or melodious. At a later period in his life than that at which any of these poems were written, he expressed again with vigour his early conviction as to the real worth and moulding effect of the study of good literature. In 1882 he writes: "The importance of reading, not slight stuff to get through the time, but the best that has been written, forces itself upon me more and more every year I live."

It is those who have something of this feeling for the excellent in literature to whom the poetry of Matthew Arnold will most appeal, and who will gain the greatest pleasure from its study; but apart from these he has a distinct place and value as the representative and exponent of one of the phases of thought of the brilliant Victorian period.

SHORT STUDIES IN ENGLISH LITERATURE.

Cloth boards. Price 6d. each.

1. Selections from Tennyson's Poems.
2. Select Comedies from Lamb's Tales.
3. An Introduction to Shakespeare's Comedies.
4. The Great Stone Face, and Other Stories (Hawthorne).
5. Pen Portraits from Carlyle.
6. Sleepy Hollow, and Other Tales (Washington Irving).
7. Longfellow's 'Evangeline.'
8. Wordsworth's Shorter Poems.
9. Pen Pictures from Macaulay.
10. Carlyle's 'Hero as Divinity,' and Matthew Arnold's 'Balder Dead.'
11. Select Tragedies from Lamb's Tales.
12. An Introduction to Shakespeare's Tragedies.
13. Ruskin's 'Sesame and Lilies.'
14. Selections from Dunbar's Poems.
15. Scottish Historical Poems and Ballads.
16. Portia, the Heiress of Belmont.
17. The Merchant of Venice.
18. Selected Passages from Boswell's Life of Johnson.
19. Longfellow's Shorter Poems.
20. The Landing of Augustine, and Edward the Black Prince.

These "Short Studies" are intended to follow after Nelson's Graded Readings. All of the volumes in this series are worthy of preservation after school days are over. The frontispiece to each book is an artistic gem. Each volume contains a short life of the author, and short explanatory footnotes.

Education a Failure!

THE JUNIOR CURRICULUM.

BY JOHN PERKINS.

(*Continued from page 153.*)

The Mother Tongue.

THE section dealing with language and literature will embrace the reading and recitation, the literature and history, the spelling and dictation, the composition and grammar of the overburdened time-table, interlaced, welded in, and correlated in a way that makes them one. Bit by bit as the art of reading is mastered the children must be introduced to the beauties of the printed word as found in prose and poem. The more valuable will be committed to memory, and oftentimes the matter to be memorised should be selected by the individual. In these days there is no lack of suitable material. There is no need to hold fast merely to the school reader. In any case, the ordinary publications dealing with geography, history, and science for these young children must be minutely examined before adoption. Such a series of general readers as Nelson's "Royal Treasury" are above suspicion; but, in addition to these, there seems to be no good reason why ordinary picture books such as are issued by many publishers should not be introduced, and adaptations such as Jack's "Told to Children Series" and Nelson's "Golden River Series" are admirably calculated to appeal to children of this age.

There are also literary masterpieces suitable in subject whose language is beyond such children. Here we have opportunity for story-telling and training in oral composition. Here, too, stories from the old mythologies, narratives of brave deeds, and the lives of brave men of all peoples and ages, talks on the common institutions of the day, will lend themselves to the same end, and gradually lead also to suitable inspiring and ennobling lessons from the history of our own land. Much that has been mere make-weight, much that has little or no bearing upon life as it exists to-day, should be ruthlessly eliminated, and the way prepared for the more serious treatment of history in the upper division.

As fluency of speech is developed, exercises in written composition will be given, and the difficulties of spelling and syntax will be dealt with as they occur. In this manner the average child should have mastered the ordinary technicalities of our language by the time he is to be transferred to the senior section.

Nature Study.

I come now to what is popularly known as nature study. In town and country much that is unreal and unnatural is practised under this title. In town and country, nature—and by nature I mean all creation—may be and should be approached and studied in natural surroundings. I do not desire to be too drastic, but, at this stage at any rate, I would reduce the indoor nature study to a very small minimum. Acquaintanceships with the earth and the sky, with the hill and the valley, with the river and the lake, with the trees and the flowers, with the birds and the insects, with animals and man, cannot well be obtained within the four walls of the school. The field of selection is sufficiently wide, and there are few schools so ill-situated as to be unable to undertake *some* profitable and real nature study.

I have probably made it clear that here I associate lessons upon elementary geographical notions. The children can be taught in this connection something of the great world about and beyond them, the outstanding features of earth and sea, the great wonders of the universe, the ways and customs of the peoples of the earth, and so accumulate notions which will assist them later to acquire a scientific knowledge of geography.

But in this group especially will it be necessary for the teacher to take up a position of "masterful inactivity." The children must not be passive recipients, but active workers: they must not listen solely to exposition, but must be led to search out knowledge for themselves.

Constructive Work.

In connection with all these there exists a very wide field of subjects suitable for constructive treatment. Drawing and modelling in a variety of media, but always with a definite aim, should be associated with literature, history, nature, and geography. Through these, among other subjects, the children have been acquiring ideas. We shall naturally and properly endeavour to ascertain the scope and accuracy of their ideas by means of the spoken and written word by which the child shall give free and unfettered expression to its own conceptions. But there is so much that cannot be expressed by these means, and here the value of drawing and modelling asserts itself. But the children must not draw or model merely what the teacher demands and desires. Here is scope for initiative and originality, and we must exercise due care that we do not set the child into a groove which we have fashioned for him.

Beyond this free expression, means must be found to give instructional lessons in which technical difficulties of manipulation may be overcome. There *is* a right and a wrong way of using pen, pencil, crayon, chalk, and brush, and the wrong method must be checked and the correct method insisted upon.

This group will naturally include whatever instruction is deemed necessary in penmanship. In several schools with which I am acquainted it has been found possible to confine such lessons to very occasional lessons in first principles. The time thus set free is utilised in other ways, and the writing is well above the average. In one such school I saw writing on *plain* paper by children of eight which would put many upper class children to shame. This, by the way, to indicate that the copybook has hitherto occupied an altogether unwarrantable portion of the time-table.

In this section we may place the elements of needlework for the girls, and exercises in paper and cardboard work may be usefully introduced for the boys in connection with the lessons in number and measures.

The Treatment of Number.

From the first, in dealing with number, the four common processes—addition and multiplication, subtraction and division—should be associated. The idea of number should be visualised by means of the bead frame, counters,

sticks, squared paper, and any other material which may be at hand. At an early stage let the child deal with money problems, using cardboard coins. Most children have practical knowledge of pence and halfpence and farthings before they enter the school walls. Thus a first notion of fractions may soon be acquired. Let them early learn and use the common signs of operation in all written exercises. After the first year, if the idea of our decimal system of notation has been properly grasped, it may be extended to embrace decimal fractions to the first, and then to the second place.

Operations with weights and measures may be gradually introduced and associated with accurate paper and cardboard work. Do not, however, be frightened into a perpetual endeavour to make all number lessons concrete and practical. The treatment of number in the abstract is a most valuable side of the training, and, moreover, is requisite to a proper appreciation of its meaning. Short methods of working should be introduced from the beginning. In fact, the ordinary processes should be alternative to the short methods, and if the principles of number have been scientifically taught, this will not be found a matter of great difficulty. So the child should arrive at the end of the junior stage of his school life with such a working knowledge of arithmetic and geometry as will permit him to apply himself to the study of elementary mathematics.

Physical Exercises and Music.

Under the heading of physical exercises, I would include singing, breathing, and voice production. Careful training in these subjects have a beneficial physical effect far outvaluing the recreative side—not that this phase should be overlooked. Then, too, by a wise selection of material, it can be made a valuable adjunct to the literature and history lesson. Many a dainty lyric and many a stirring ballad have been set to charming music.

In the matter of physical exercises proper, the Code allows us very little initiative, but a careful introduction of some of the old-world dances and games would be of value.* Organised games, as ordinarily understood, should be taboo. The very essence of a game is so often squeezed out in the process of organisation that I would leave the children to work out their salvation—always providing, of course, that the teaching staff give encouragement and exercise unseen supervision.

Thus, then, would I fashion the curriculum for the junior school, providing exercise for every sense, adding to the store of self-acquired knowledge, quickening the intellect, sharpening the wits, and stirring up a longing to dip deeper into the entrancing sea of knowledge and of life.

* Since this was put into type the suggestion has received an official blessing.

EDITOR'S APOLOGY.

In the September number of this paper a statement was made, through inadvertence, which has caused some annoyance to teachers in L.C.C. schools. This occurred in Mr. Bowe's article entitled, "An Educational Excursion to the Isle of Wight," in which it is stated that the trip was "the first out of London from schools under the Council." The author of the paper merely wished to state that the journey was the first out of London conducted by himself, an entirely different matter.

A CORRELATED SCHEME BASED UPON ÆSOP'S FABLES.

WORK FOR SECOND MONTH.

Object Lesson on the Crow.

Illustrations.—Picture of crow. Sketch of crow's beak and lark's beak, crow's foot and lark's foot, crow's nest and lark's nest.

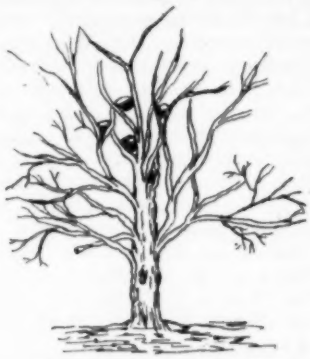
Aim.—1. To emphasise connotation of term "bird."

2. To train powers of comparison and classification.

Preparation.—Connect with tale. What is the name of the bird in sketch shown? What is he doing? Why? What made him thirsty? How long had he been flying?

Presentation.—This lesson to take the form of a comparative lesson between the lark and the crow.

(*a*) *Both are Birds.*—By examination of sketch lead children to suggest that the crow has two wings, two legs, feathers, beak, and that the lark has the same. Therefore the crow is a bird.



Teacher's Illustration.

Inference.—By question lead children to suggest that if crow is a bird it will have hollow bones and will build nest and lay eggs.

(*b*) *Difference in Appearance.*—Make children compare colour, size, shape of beak.

(*c*) *Difference in Habits.*—The habits of the crow to be told to the children by the teacher. The children should then be led to state the comparison for themselves.

Lark's Foot.

Crow's Foot.

1. The lark is a singing bird. The crow is not a singing bird.
2. The lark feeds on worms, insects, etc. The crow feeds on carrion.
3. The lark builds its nest on the ground. The crow builds its nest in a high tree.

Reading Lesson.

Sound taught, *er.* Crow, crop, crept, crash, cross, crunch, crust.

The crow was in the crop of wheat. The farmer crept up, and crash went a stone. "Caw, caw!" cried the crow. "Do not

Crow's Head.

Lark's Head.

be cross, farmer. I will not eat the wheat, but I will crunch the worms as you crunch a crust."

Object Lesson on Water.

First Lesson.

Illustrations.—Picture or sketch of stream. Sketch of pump, water-tap. Piece of lead-piping.

Aim.—1. To train children's powers of expression by leading them to state clearly facts which come under their daily observation.

2. To teach source of water supply in towns.

Preparation.—Connect with tale. What was the clever crow looking for? Why was he looking for water? Why did he want to drink?

Presentation.

Uses of Water.

1. *For Drinking.*—By questioning bring out that every one requires to drink. All animals require to drink. Plants require water.

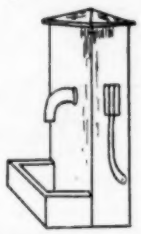
2. *As the Foundation of all Beverages.*—Draw on the children's experience of the process of making tea, coffee, cocoa. Tell them that water is also used in the making of beer, etc.

3. *For Cooking.*—Question on the cooking of eggs, potatoes, vegetables, etc.

4. *For Cleansing.*—Get children to describe the washing of dishes, floors, clothes, etc.; also the care of their own persons. Make them see the impossibility of keeping either themselves or their houses clean without the use of water.

Source of Water Supply.

1. *Use of Water-tap.*—By questioning draw from children use of water-tap. Let children examine tap and notice hollow tube; how the tap when turned off shuts off part of tube.



Teacher's Illustration.

2. *How the Water reaches the Tap.*—The children are familiar with the sight of the water-man turning on the main in the street. Draw on this knowledge, and explain how the water which they see bubbling up comes from a large pipe under the ground. Show piece of lead-piping, and tell children how every water-tap has a long pipe joined to the big one in the street.

3. *How the Water reaches the Main Pipe.*—Describe reservoir. Sketch and show number of large pipes running from it. Try to give children an idea of its size.

4. *How the Reservoir is supplied.*—Show sketch of stream. Describe how it is made to flow into reservoir; how the banks of the reservoir dam up the water.

Second Lesson.

Aim.—To teach experimentally some of the common properties of water, and to lead children to see the value of these properties.

Presentation.

Experiment.	*Observation.*	*Inference.*	*Application.*
1. Let child close eyes and taste vinegar, milk, tea, coffee.	Vinegar tastes sour. Milk, tea, coffee, can each be recognised.	Each has its own taste.	
2. Let child sip water.	Water does not taste sour like vinegar; does not taste like either tea, coffee, or milk.	Water has no taste of its own.	Water does not give a taste to anything cooked in it.
3. Let children close eyes and smell vinegar and coffee.	Vinegar and coffee can be recognised; water cannot.	Water has no smell.	Water will not give a smell to things cooked in it.
4. Hold piece of paper behind glass containing water and glass containing tea.	Paper can be seen through glass of water, but not through glass of tea.	Water is transparent.	We can easily see dirt or mud in water, and this helps us to see if the water be fit to drink.
5. Pour some water on a slate. Slant the slate first up and then down. Place glass in basin, and pour in water till it overflows.	Water flows down in both cases.	Water always flows down, never up.	This helps us to get water from place to place. The pipes must be laid from a high place to a low one.
6. Put some bits of straw or chips in a cup or jug. Fill with water and pour out.	Straw and chips are carried away by the water.	Water moves other things.	Water is useful in carrying away refuse matter.

Reading Lesson.

Sounds, *use* and *ing*.

We could not do without water. We use water for drinking. We use water for cooking. Water is used for cleaning.

Object Lesson on Clay.

Objects required for the Lesson.—A lump of moist yellow clay—one of moist pipeclay. Some dried clay with seal impressed. Some water. Sand-tray and soil.

Aim.—To teach some of the common properties of clay.

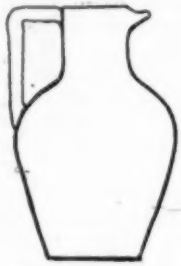
Preparation.—Connect with tale. What did the crow want?

Brushwork.

What did he look for first? What is a pool? What makes a pool? What happens to the rain that falls round the pool?

Presentation.—1. Mould clay into the form of a ball, cup, etc. Let children see that it is plastic. [Omit word plastic.]

BRUSHWORK.



FREEARM DRAWING.

2. Pour water into cup. Let children see how it holds water.

3. Pour water on heap of soil. Children will see how it sinks through the soil. Tell children where clay is found and draw on their own experience of finding clay where workmen have been digging deep down in the streets. By questioning get children to suggest that there must be clay wherever there is a pool. Refer to lesson on water, and explain that a reservoir is lined with clay.

4. Stamp seal on clay, and let children see the impression made.

5. Let children examine dry clay and moist clay, and note differences.

Reading Lesson.

Sound, *cl*. Clay, clasp, close, clang, cloth, cling.

Our class had a lesson on clay. We each got a lump of clay, and teacher told us to make a clasp like the clasp of her belt. We could not make the clasp close. Just then, clang went the bell. Kate got a cloth to wipe the desk, and we went out to play. We saw the babies clinging to teacher.

OBJECT LESSON ON THE JUG.

Things required.—Jug. Piece of unglazed ware or some broken pieces of pottery ware.

Aim.—To teach manufacture of pottery.

FREEARM DRAWING.

Method.—Tell children that pottery is made from clay. The process of moulding and baking should be suggested by the children from lesson on clay. Show glazed and unglazed specimens. Make children notice difference, and suggest advantage of glazing. Describe process.

Recitation.

THE CATARACT OF LODORE.

From its fountains
In the mountains,
Through moss and through brake,
It runs and it creeps
For awhile, till it sleeps
In its own little lake.—*Southey.*

THE CROW AND THE PITCHER.

One summer day a thirsty crow
Went vainly seeking, to and fro,
Rushing stream or shady pool,
Wherein his burning thirst to cool.
At length a pitcher he espied,
And gladly fluttered to its side.
Alas! though water in it lay,
And sparkled in the sun's bright ray,
He stretched and strained his neck in vain:
No single drop could he obtain.
Then looking round, some stones he saw,
And with a joyous little caw
He seized them with his strong black bill,
And dropped them in, the jug to fill.
Slowly before his anxious eyes
He gladly saw the water rise.
He quenched his thirst, then flew away,
As joyous as the summer day.—*Original.*

Brushwork.—Illustrations 6 and 7.
Freearm Drawing.—Illustrations 8 and 9.
Colouring.—Illustration 10.
Singing.—"The Water Fairy" (May Gillington's *Action Songs*).

COLOURING.

Writing.—The crow saw some water in a big jug, but he could not get at it. At last he got some small stones and threw them into the jug till the water came up to the top.

THE SCHOOL NATURE STUDY UNION.

WINTER PROGRAMME, 1909–10.

Meetings to be held at the College of Preceptors, Bloomsbury Square, W.C., except where otherwise stated.

Friday, October 15, at 7.45 p.m.—"Some recent Experiments in the Teaching of Nature Study," by Miss C. von Wyss. Chairman, J. W. Peck, Esq., M.A.

Wednesday, November 10, at 7.45 p.m.—"Mahomet and the Mountain," by Mrs. A. L. Sandford. Chairman, Miss M. Penstone.

Saturday, December 11, at 3 p.m.—"The Atmosphere as an Open Air Nature Study" (illustrated by lantern slides), by G. G. Lewis, Esq. Chairman, Dr. T. Percy Nunn, M.A.

Friday, January 21, at 7.45 p.m.—"British Grasses" (illustrated by lantern slides), by J. Groves, Esq. Chairman, Lady St. Helier.

Saturday, February 19, at 3 p.m.—Annual Conference and Publishers' Exhibition, to be held at the London Day Training College, Southampton Row, W.C.

"Flowers and their Visitors" (illustrated by lantern slides), by Professor J. R. Ainsworth Davis, M.A., F.C.P. (Principal of the Royal Agricultural College, Cirencester). Chairman, Sir George Kekewich, K.C.B., M.P.

N.B.—Further details will be given in the January Journal.

Wednesday, March 9, at 7.45 p.m.—"Wasps: a subject for Nature Study," by Miss C. E. Isaacson. Chairman, Miss R. B. J. Lulham, B.Sc.

Henry E. Turner, General Secretary,
1 Grosvenor Park, Camberwell, S.E.

Our Query Column.

SOLUTIONS BY A. CLEMENT JONES, M.A., PH.D., SENIOR MATHEMATICAL MASTER, BRADFORD GRAMMAR SCHOOL.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the name and address of the correspondent, and the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

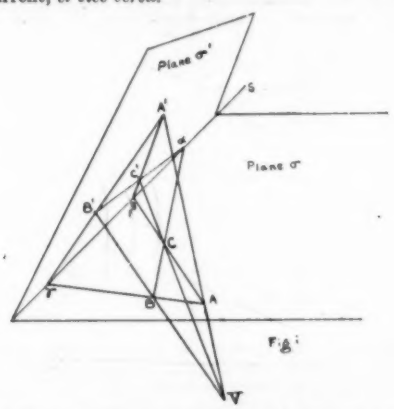
The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

Timmy.—Project the circle $x^2 + y^2 = 9$, which is in a horizontal plane from a point 5 units vertically above the point (4, 0), on to a vertical plane through the line $y = 3$, and rabate the figure about this line into the horizontal plane.

(B.Sc. Final.)

Many of my readers ask questions about mathematical drawing which involve no real difficulty, provided the fundamental principles are understood. The operation of rabatting is not very clearly explained in the books I have recommended; and as the present query is really a quite simple case, I am giving here an explanation of the underlying principles, which I hope these readers will preserve for future reference.

The proposition—a proof of which occurs in all books on projective geometry—on which the theory is based is that "coaxal triangles are also copolar," and "copolar triangles are also coaxal." Or, in simple language, "if corresponding sides of two triangles, however situated, meet in three collinear points, the joins of corresponding vertices are concurrent, *et vice versa*."



Now in Fig. 1 suppose any figure in the plane σ projected from the point V on to the plane σ'—that is, every point of the figure in the plane σ is joined to the vertex V and the joins produced to meet the plane σ' in the required corresponding points. We shall call the figure in the plane σ the original figure, and that in the plane σ' the projected figure. Now the line of intersection of the two planes s projects into itself, and is called the axis of projection.

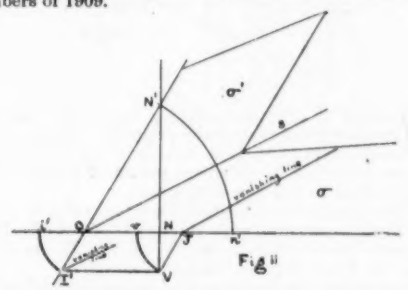
Suppose now the plane σ' (with the projected figure) is rotated about the axis s until it coincides with the plane σ, the projection is said to be rabatted into the plane σ.

Our object now is to find a method of drawing the rabatted figure *directly*, and it should be obvious that the idea of rabatting arose from the necessity of drawing the whole figure in the plane of the paper (for example, the section of a cone by any plane can be obtained in the same plane as the base of which it is a projection).

Let A, B, C be any three points in the original figure, and A′, B′, C′ their projections in the plane σ'. Since AA′, BB′, CC′ meet at V, the triangles ABC, A′B′C′ are copolar; therefore they are coaxal—that is, AB, A′B′; BC, B′C′; CA, C′A′ meet in three collinear points evidently on the axis s. These points in the figure are α, β, γ.

Now when the plane σ is rabatted about s, in every position these corresponding sides still intersect on s, for the points α, β, γ are stationary. Hence the triangles remain coaxal, therefore they remain copolar—that is, AA′, BB′, CC′ still meet in some point, say V′. We might consider the points AB, A′B′ similarly along with any two corresponding points PP′, and by the same argument in every position of the plane σ' as it revolves about s. AA′, BB′, ... PP′ meet at a point.

Now if we can find the new position of the vertex of projection when the plane σ' coincides with σ, and also the position of one pair of corresponding points, we can, since the axis is known, draw the rabatted figure by the ordinary rules of perspective which I explained in the April and May numbers of 1909.



In Fig. 2 let the plane of the paper be a plane through V perpendicular to the axis of projection s. ON, ON′ are the intersections of the planes σ, σ' with this plane.

Draw VJ parallel to ON′ and VI′ parallel to ON. Then a line through J parallel to s projects into the line at infinity in the plane σ', and is the vanishing line in the original figure. Lines in the plane σ which intersect on this line project into parallel lines in the plane σ'. So a line through I′ parallel to s is the projection of the line at infinity on the plane σ; I′ in particular is the projection of the point I at infinity on OJ. Hence I′ is a definite point in the projected figure, and consequently, as σ revolves round s, I′ describes a circle about O. But I′ remains the projection of I, therefore II′ –that is, a line through I′ parallel to OJ—always passes through the centre of projection. By the same argument VJ is always parallel to ON′, hence JV = OI′, and the locus of V is a circle about J. The rabatted position of V is therefore v.

If VN be drawn perpendicular to OJ to meet ON′ at N′, then N′ is the projection of N. N′ describes a circle round O, and its rabatted position is n'. By elementary geometry N′n', Vv, i′I′ are all parallel, hence the following rules for finding v:—

(1) Draw VN perpendicular to the plane of the original figure to meet the plane of projection in N′.

(2) Draw NO perpendicular to the axis of projection.

(3) With centre O and radius ON′ describe a circle meeting ON in n'.

(4) Draw Vv parallel to N′n' to meet ON at v. Then v is the centre of perspective of the original figure and the rabatted projected figure.

In this construction we are only concerned with points on ON, and nothing is altered relatively if we rotate the plane VJN′O through a right angle about ON. We can then make the construction in the plane σ, and take this as the plane of the paper.

Note VN is then a line perpendicular to ON, whose length is the perpendicular distance of the centre of projection from the plane σ.

Fig. 3 shows the projection of the circle given in the query rabatted about the axis. The letters in the figure

correspond to those in Fig. 2. Here ON′ is infinite, but N′*v*′ evidently makes an angle 45° with *s*. NV is given 5 units, hence N*v* is 5 units.

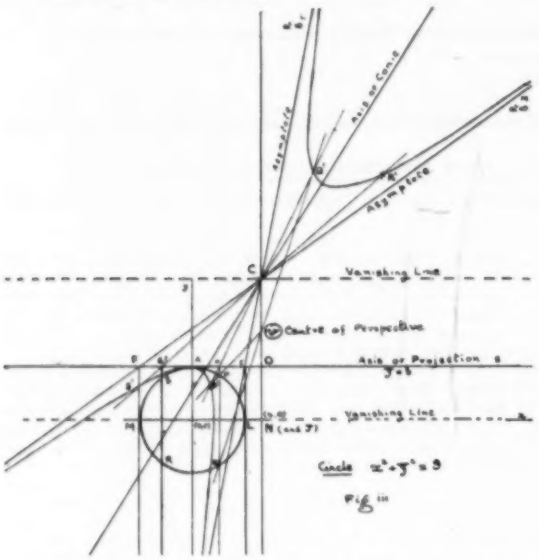


Fig. III

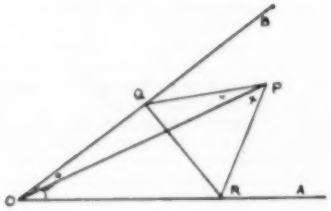
The axis of x is the vanishing line in the original figure, and the line $y = 5$ that in the projected figure.

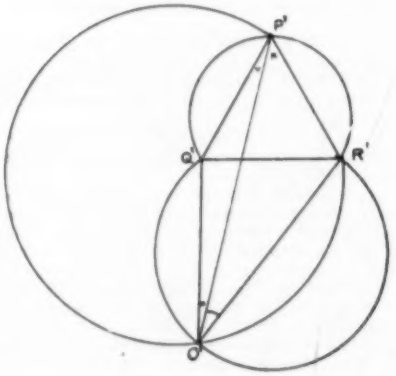
The tangents at M, L to the circle project into tangents to the projected figure whose points of contact are at infinity—that is, into the asymptotes.

Lines parallel to ON—that is, intersecting at infinity on the line *v*O—must all pass through C, the projection of this point at infinity. Hence (see Fig. 3) FC, EC are the asymptotes for F and E projected into themselves.

In drawing the figure several corresponding points were constructed. The construction for P′Q′ corresponding to PQ is shown. Thus DC corresponds to PQ, for D projects into itself and the point at infinity on PQ into C. But PP′, QQ′ pass through *v*—that is, *v*P and *v*Q meet DC at P′ and Q′.

Etienne.—Given two intersecting straight lines and any point between them, construct an equilateral triangle having one angular point at the given point and the other two on the given lines.





Let OA, OB be the given straight lines and P the given vertex.

Take any straight line Q′R′, and on one side of it describe the arc Q′P′R′ of a circle containing an angle equal to that of an equilateral triangle. On the other side of Q′R′ describe the arc Q′O′R′ of a circle containing an angle equal to the angle AOB.

Join OP, and take P′, the middle point of the arc Q′P′R′. Join P′Q′, P′R′.

Now on P′R′ describe the arc of a circle containing an angle equal to POA, and let it intersect the arc Q′O′R′ at O′. Join O′P′, and make the angles OPR, OPQ respectively equal to O′P′R′ and O′P′Q′. Join QR.

Now $\angle Q'O'R' = \angle BOA$ (by construction)

$\angle P'O'R' = \angle POA$ (by construction),

hence $\angle P'O'Q' = \angle POQ$.

Also $\angle O'P'Q' = \angle OPQ$ and $\angle O'P'R' = \angle OPR$,

hence the pairs of triangles OPQ, O′P′Q′; OPR, O′P′R′ are equiangular, and therefore similar. Hence

$$OP : PQ = O'P' : P'Q',$$
$$OP : PR = O'P' : P'R'.$$
$$\therefore \quad PQ : PR = P'Q' : P'R'.$$

But P is the mid-point of the arc Q′P′R′,

$$\therefore \quad P'Q' = PR,$$

and consequently $PQ = PR$.

But the angle QPR is equal to Q′P′R′, and is therefore the angle of an equilateral triangle, hence PQR is an equilateral triangle.

François.—Prove that the pole of any straight line through a focus of a conic has the focus itself for its orthogonal projection on the straight line.

If $A_1A_2 \ldots$ be a series of points lying on a straight line, and OB_1, $OB_2 \ldots$ be their polars with respect to a conic S, show that a conic can be constructed having OA_1 and OB_1, OA_2 and $OB_2 \ldots$ for pairs of conjugate diameters. (B.Sc., 1908.)

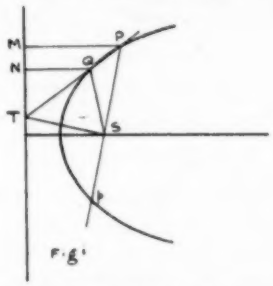


Fig.

Let PQ be two near points on the curve. Join PQ and let it meet the directrix at T. Join SQ, PS*p*, ST, and draw PM, QN perpendicular to the directrix.

By the definition of focus and directrix

$$SP = ePM \text{ and } SQ = eQN.$$
$$\therefore \quad SP : SQ = PM : QN$$
$$= PT : QT \text{ (PM parallel to QN).}$$

Hence *Euclid*, VI. 3A,

$$\angle QST = \angle TSp.$$

When Q coincides with P, PT becomes the tangent at P, and the property just proved becomes in the limit

$$\angle TSP = \angle TSp.$$

∴ if the tangent at P meet the directrix at T, the angle TSP is a right angle. Evidently then, since the angle *p*ST is a right angle, the line *p*T is a tangent to the conic at *p*.

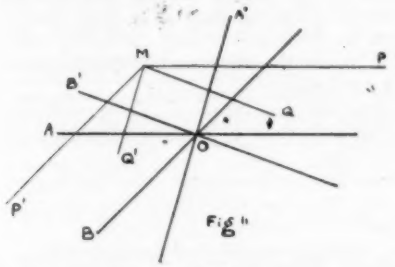
This proves the proposition.

The second half of this query follows easily from the proposition—"Conjugate lines of a conic form a pencil in involution." Thus the pairs of lines OA_1, OB_1; OA_2, $OB_2 \ldots$ are corresponding rays in an involution. In particular conjugate diameters of a conic determine a pencil in involution.

Further, two pairs of corresponding rays determine an involution—that is, the four lines OA_1, OB_1, OA_2, OB_2 being known we can determine from them without reference to the conic the other pairs OA_3, OB_3, etc.

Take two pairs then, OA, OB, OA′, OB′, and let M be any point. Any conic which has OA, OB; OA′, OB′ for conjugate diameters, and which passes through M, must

also pass through the four points P, P', Q, Q', determined so that MP is parallel to OA and bisected by the conjugate diameter OB. This gives five points M, P, P', Q, Q' on the conic, and thus determines the conic.



Now since OA, OB, OA', OB' are conjugate diameters of this conic, the pairs of lines in the involution determined by these are also conjugate diameters of the conic. Hence we have constructed a conic which has OA_1, OB_1; OA_2, OB_2, etc., as pairs of conjugate diameters.

N.B.—The axes of the conic can be found by determining the orthogonal pair of rays in the involution determined by OA_1, OB_1, OA_2, OB_2.

Chelt.—Prove that $\int \frac{\sin^m x}{a + b\cos x}\,dx$ can be integrated in finite terms when m is an integer.

Let $$I_m = \int \frac{\sin^m x}{a + b\cos x}\,dx,$$

then $$I_m = \int \frac{\sin^{m-2} x\,(1 - \cos^2 x)}{a + b\cos x}\,dx$$

$$= \frac{1}{b^2}\int \frac{\sin^{m-2} x\,(b^2 - a^2 + a^2 - b^2\cos^2 x)}{(a + b\cos x)}\,dx$$

$$= \frac{b^2 - a^2}{b^2}\int \frac{\sin^{m-2} x}{a + b\cos x}\,dx + \frac{1}{b^2}\int \sin^{m-2} x\,(a - b\cos x)\,dx$$

$$= \frac{b^2 - a^2}{b^2}\cdot I_{m-2} + \frac{a}{b^2}\int \sin^{m-2} x\,dx - \frac{1}{b}\int \sin^{m-2} x\cdot\cos x\,.\,dx$$

$$= \frac{b^2 - a^2}{b^2}\cdot I_{m-2} + \frac{a}{b^2}\int \sin^{m-2} x\,dx - \frac{\sin^{m-1} x}{b(m-1)}.$$

Now the integral $\int \sin^{m-2} x\,dx$ is dealt with for positive and negative values of $(m - 2)$ in Sections 66, 69, 70 of Edwards's *Integral Calculus*.

Hence $$I_m = \frac{b^2 - a^2}{b^2}\,I_{m-2} + \text{a known quantity},$$

and equally $$I_{m-2} = \frac{b^2}{b^2 - a^2}\cdot I_m + \text{a known quantity}.$$

Thus whether m is positive or negative, by using these formulæ of reduction respectively, the original integral can be reduced to either I_1 or I_0—that is, to

$$\int \frac{\sin x\,dx}{a + b\cos x} \text{ or } \int \frac{dx}{a + b\cos x}.$$

The former integral is $-\frac{1}{b}\log(a + b\cos x)$ and the latter is a standard form. Hence I_m can be integrated in finite terms for all integral values of m.

Trigonometry.—If α, β, γ are three angles, unequal and less than 2π, which satisfy the equation

$$\frac{a}{\cos x} + \frac{b}{\sin x} + c = 0,$$

show that $\sin(\beta + \gamma) + \sin(\gamma + \alpha) + \sin(\alpha + \beta) = 0$.
(Board of Education, 1909.)

In the given equation put $t = \tan\frac{x}{2}$. The equation becomes $a\sin x + b\cos x + c\sin x\,.\,\cos x = 0$,

and dividing by $\cos^4\frac{x}{2}$ we get

$$2at(1 + t^2) + b(1 + t^2)(1 - t^2) + 2ct(1 - t^2) = 0;$$

that is, $$b\,.\,t^4 + 2(c - a)t^3 - 2(c + a)t - b = 0. \ldots \quad \text{(i)}$$

The roots of this are

$$t_1 = \tan\frac{\alpha}{2},\ t_2 = \tan\frac{\beta}{2},\ t_3 = \tan\frac{\gamma}{2},\ t_4 = \tan\frac{\delta}{2}.$$

Then from (i)

$$\Sigma t_1 t_2 = 0 \text{ and } t_1 t_2 t_3 t_4 = -1.$$

Eliminating t_4 from these, we get

$$t_1 t_2 t_3(t_1 t_2 + t_2 t_3 + t_3 t_1) - (t_1 + t_2 + t_3) = 0;$$

that is, $$\Sigma t_3(1 - t_1^2 t_2^2) = 0;$$

that is, $$\Sigma \tan\frac{\gamma}{2}\left(1 - \tan^2\frac{\alpha}{2}\,.\,\tan^2\frac{\beta}{2}\right) = 0;$$

that is, multiplying through by

$$2\cos^2\frac{\alpha}{2}\cos^2\frac{\beta}{2}\cos^2\frac{\gamma}{2}\,.$$

$$\Sigma \sin\gamma\left(\cos^2\frac{\alpha}{2}\cos^2\frac{\beta}{2} - \sin^2\frac{\alpha}{2}\sin^2\frac{\beta}{2}\right) = 0;$$

that is, $$\Sigma \sin\gamma\,.\,\cos\frac{\alpha + \beta}{2}\,.\,\cos\frac{\alpha - \beta}{2} = 0;$$

that is, $$\Sigma \sin\gamma\,(\cos\alpha + \cos\beta) = 0,$$

or $$\sin(\beta + \gamma) + \sin(\gamma + \alpha) + \sin(\alpha + \beta) = 0.$$

The following rather shorter method, which involves the use of the imaginary quantity $\sqrt{-1}$, occurs in my *Notes on Analytical Geometry*.

In the equation given substitute exponential values for $\cos x$ and $\sin x$, and we get immediately

$$c\,.\,e^{4ix} + 2(a + ib)e^{3ix} - 2(a - ib)e^{ix} - c = 0.$$

Hence $$\Sigma e^{i(\alpha + \beta)} = 0 \text{ and } e^{i(\alpha + \beta + \gamma + \delta)} = -1.$$

Thus $$e^{i(\alpha + \beta)} + e^{i(\beta + \gamma)} + e^{i(\gamma + \alpha)} + e^{i(\delta + \alpha)} + e^{i(\delta + \beta)} + e^{i(\delta + \gamma)} = 0.$$

But $$e^{i(\gamma + \delta)} = -e^{-i(\alpha + \beta)}, \text{ etc.}$$

$$\therefore \quad \left\{e^{i(\alpha + \beta)} - e^{-i(\alpha + \beta)}\right\} + + = 0;$$

that is, $$\sin(\alpha + \beta) + \sin(\beta + \gamma) + \sin(\gamma + \alpha) = 0.$$

Imperator.—Prove that

$$\tan^{-1}(x + h) = \tan^{-1} x + h(\sin\theta)\,.\,\sin\theta - \frac{(h\sin\theta)^2}{2}\,.\,\sin 2\theta + \frac{(h\sin\theta)^3}{3}\sin 3\theta - \frac{(h\sin\theta)^4}{4}\,.\,\sin 4\theta + \text{etc.},$$

where $x = \cot\theta$.

By Taylor's Theorem

$$\tan^{-1}(x + h) = \tan^{-1} x + h\,.\,\frac{d(\tan^{-1} x)}{dx} + \frac{h^2}{2!}\,.\,\frac{d^2(\tan^{-1} x)}{dx^2} + \frac{h^3}{3!}\frac{d^3(\tan^{-1} x)}{dx^3} + \ldots$$

the general term in which series is

$$\frac{h^n}{\lfloor n}\,.\,\frac{d^n(\tan^{-1} x)}{dx^n},$$

so that we want to find the n^{th} differential of $\tan^{-1} x$.

Now if $$y = \tan^{-1} x,$$

$$\frac{dy}{dx} = \frac{1}{1 + x^2} = \frac{1}{2i}\left(\frac{1}{x - i} - \frac{1}{x + i}\right).$$

$$\therefore \quad \frac{d^n y}{dx^n} = (-1)^{n-1}\,.\,\frac{\lfloor n - 1}{2i}\left[\frac{1}{(x - i)^n} - \frac{1}{(x + i)^n}\right].$$

Put $x = \cot\theta$,

$$\therefore \quad = (-1)^{n-1}\,.\,\frac{\lfloor n - 1}{2i}\,.\,\sin^n\theta\left[\frac{1}{(\cos\theta - i\sin\theta)^n} - \frac{1}{(\cos\theta + i\sin\theta)^n}\right]$$

$$= (-1)^{n-1}\,.\,\frac{\lfloor n - 1}{2i}\,.\,\sin^n\theta[(\cos\theta + i\sin\theta)^n - (\cos\theta + i\sin\theta)^{-n}]$$

$$= (-1)^{n-1}\,.\,\frac{\lfloor n - 1}{2i}\,.\,\sin^n\theta[\cos n\theta + i\sin n\theta - \cos n\theta + i\sin n\theta]$$

$$= (-1)^{n-1}\lfloor n - 1\,.\,\sin^n\theta\,.\,\sin n\theta.$$

Hence the general term in the series found

$$= (-1)^{n-1}\frac{(h\sin\theta)^n}{n}\,.\,\sin n\theta,$$

which agrees with the given result.

Devodalry.—Show that

$$\int_a^b \phi(x)\,dx = \frac{b-a}{q-p}\int_p^q \phi\left(\frac{aq-bp}{q-p} + \frac{b-a}{q-p}x\right)dx.$$

Let $$x = \frac{b-a}{q-p}\cdot y + \frac{aq-bp}{q-p},$$

then $$dx = \frac{b-a}{q-p}dy, \text{ and when } x = a,$$

$$\frac{b-a}{q-p}y = \frac{aq-bp}{q-p} - x = \frac{aq-bp}{q-p} - a = \frac{(b-a)p}{q-p};$$

that is, $y = p$.

Similarly, when $x = b$, $y = q$,

$$\text{then } \int_a^b \phi(x)\,dx = \int_p^q \phi\left(\frac{aq-bp}{q-p} + \frac{b-a}{q-p}y\right)\cdot\frac{dx}{dy}\cdot dy$$

$$= \int_p^q \phi\left(\frac{aq-bp}{q-p} + \frac{b-a}{q-p}y\right)\cdot\frac{b-a}{q-p}dy,$$

and since in a definite integral the variable used is immaterial,

$$= \frac{b-a}{q-p}\int_p^q \phi\left(\frac{aq-bp}{q-p} + \frac{b-a}{q-p}x\right)dx.$$

MODERN SCIENCE NOTES.

BY J. G. M'INTOSH, B.SC., SECONDARY SCHOOL, GATESHEAD.

The British Association Meeting of 1909.

SCIENTIFIC interest during the last month has chiefly centred round the meeting of the British Association at Winnipeg. Sir J. J. Thomson in his inaugural address treated his audience to his opinions on some of the educational questions of the present day. From so pre-eminent an authority in scientific research such opinions are interesting to those engaged in education. Sir J. J. Thomson considers that the chief evil at Cambridge at the present time is the excessive competition for scholarships, leading to premature specialisation by the student, injuring him by depriving him of adequate literary culture, and retarding the progress of science by isolating one science from another. The minute acquaintance required in one particular subject, gathered often from books alone, dulls the enthusiasm of the student and blunts the keenness of his wits for research. In a considerable experience with students of physics, Sir J. J. Thomson has met more failures from lack of enthusiasm and determination than from any lack of cleverness or knowledge.

The President urged strongly the correlation of mathematics and physics, discountenancing the present tendency there is in many quarters to discourage the use of mathematics in physics. One sincerely hopes that such a view is but rarely held, although it must be admitted that the pure mathematician has often failed to grasp the wholly practical side of the problem. We remember quite recently an article by Professor Bryan urging the application of mathematics to aeronautics. In the meantime, world's records are being broken daily by the practical engineer largely devoid of the most elementary mathematical knowledge. The truth is that mathematics used with discretion is a good servant but a bad master. For this reason it is considerably more important for the mathematician to study physics than for the physicist to study mathematics. In the school especially the study of mathematics should go hand in hand with the science curriculum.

Incidentally we notice Sir J. J. Thomson's severe condemnation of the competitive examination, and we commend his remarks to those secondary schoolmasters who still think the Alpha and Omega of the school course a good examination list.

The remainder of Sir J. J. Thomson's address was devoted to a review of scientific progress during the last few years.

He contrasted the physical methods by electrical means with those of the chemist on the research into the properties of matter.

"The smallest quantity of unelectrified matter ever detected is probably that of neon, one of the inert gases of the atmosphere. Professor Strutt has shown that the amount of neon in ·05 cc. of air at ordinary pressures can be detected by the spectroscope; Sir W. Ramsay estimates that the neon in the air only amounts to 1 part of neon in 100,000 parts of air, so that the neon in ·05 cc. of air would only occupy at atmospheric pressure a volume of half a millionth of a cubic centimetre. When stated in this form the quantity seems exceedingly small, but in this small volume there are about ten million million molecules. Now the population of the earth is estimated at about fifteen hundred millions, so that the smallest number of molecules of neon we can identify is about seven thousand times the population of the earth. In other words, if we had no better test for the existence of a man than we have for that of an unelectrified molecule, we should come to the conclusion that the earth is uninhabited. Contrast this with our power of detecting electrified molecules. We can, by the electrical method, detect the presence of three or four charged particles in a cubic centimetre. Rutherford has shown that we can detect the presence of a single α particle. Now the α particle is a charged atom of helium. If this atom had been uncharged, we should have required more than a million million of them before we should have been able to detect them."

The study of electrified particles being so much easier led the President to discourse on the ultimate structure of electricity. He gave an interesting instance of the dependence of the physicist on the mathematician. Some years before the discovery of "corpuscles"—as the smallest known units of negative electricity are termed—mathematical investigation showed that the mass of a body must be increased by an electrical charge, and that the increase is greater for small bodies than large ones, and even atoms are hopelessly too large to show any appreciable effect. The result therefore appeared entirely academic. The increase, however, in the mass of the corpuscle on its discovery became so apparent, owing to the minuteness of its size, that the further experiments of Kaufmann and Bucherer have shown that the whole of its mass arises from its charge.

Dealing with the structure of positive electricity, the President is of the opinion that it may be obtained from any kind of matter in the same way as the negative corpuscle.

Reference to Dr. Goldstein's experiments on "canalstrahlen" shows that the positive particles are the same whatever the gas used when the pressure is low. Further experiments at Cambridge strongly support the view that there is a definite unit of positive electricity independent of the gas from which it is derived, and different from the negative unit. The mass of the latter is small

CLOUGH'S CORRESPONDENCE COLLEGE

The Oldest and most Successful Correspondence College.

PRELIMINARY CERTIFICATE

(PART I. DECEMBER 1909. PART II. MARCH 1910.)
Also Classes for (a) Candidates who failed in Part II., April 1909.
(b) Candidates who passed in Part II., and wish to sit again to obtain Distinctions.
Syllabus for 1911 Examinations on Application.

P.T.

Education Authorities' Admission Examinations.
Also Class Preparatory to the Preliminary Certificate Course.

CERTIFICATE.

DECEMBER 1910.—Students should commence at once.
* DECEMBER 1911.—Applications now entertained.
** Syllabus for 1911 post free on Application.*

OXFORD AND CAMBRIDGE

SENIOR LOCALS.

Classes for the December 1909, March and July 1910, Examinations.

A.C.P. Classes for the December 1909 and August 1910 Examinations.

L.L.A. Classes for May 1910.

MATRICULATION.

Classes for the January, June, and September 1910 Examinations.

PROSPECTUS, DETAILS OF **BRILLIANT SUCCESSES**, PRIZE SCHEME, TERMS, ETC., of any of these Classes will be forwarded immediately on application to the

SECRETARY,
CLOUGH'S CORRESPONDENCE COLLEGE,
TEMPLE CHAMBERS, LONDON, E.C.

28 Years' Trading!

THE EDUCATIONAL MUSICAL INSTRUMENT COMPANY

(J. W. MORTON, Manager),

18 & 19 Highbury Place,
LONDON, N.;
and 21 Argyle Crescent,
PORTOBELLO,
EDINBURGH.

MANY THOUSANDS of Teachers, School Managers, etc., including over **Thirty of H.M. Inspectors of Schools,** are using and recommending our Instruments, of which we have specimens **in every County of the British Isles.**

We pay carriage, give a month's free trial, a ten years' warranty, and **exchange free of cost** if the instrument sent is not all that is desired. See our **48 Guinea** Prize Medal Upright Iron Grand Piano for **£21 cash,** or thirty-six payments of 13s. 5d. per month. Quite new, rich, full tone, and thoroughly durable.

CYCLES, CAMERAS, & FURNITURE
on special terms.

Dr. MACNAMARA, M.A., M.P., writes: "We are more than delighted with the Piano which you recently selected for and supplied to us. Any of my friends who need an instrument cannot possibly do better than place themselves entirely in your hands."

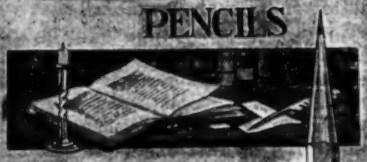
Sir J. H. YOXALL, M.A., M.P., Gen. Sec. N.U.T., writes: "For the fourth time I have experienced, for myself or for relatives, the special value, wide selection, and expert advice which your clients gain. Each of the four Pianos has given perfect satisfaction."

Showrooms open daily. Write for our List, specifying the class preferred,

WE CAN SAVE YOU MANY POUNDS.

(Please mention this Paper.)

L. & C. Hardtmuth's
"KOH-I-NOOR" PENCILS



FOR ALL DESK, STUDY OR STUDIO WORK

There is nothing like the Koh-I-Noor, the beautifully finished pencil, which takes a fine point, wears well, and does its work with a silken touch free from jarring irritations through faulty flaws. There's no doubt about the pleasure of using a Koh-I-Noor. It is more economical too, as it lasts so much longer than ordinary pencils.

Price 4d. each, 3/6 per dozen, everywhere. Of Stationers, etc. Price List free from L. & C. HARDTMUTH, 12 Golden Lane, London, E.C.
(Paris, Brussels, Dresden, Milan, Vienna, New York.)

compared with the atom, while that of the former is quite comparable with the mass of an atom of hydrogen.

"A knowledge of the mass and size of the two units of electricity, the positive and the negative, would give us the material for constructing what may be called a molecular theory of electricity, and would be a starting-point for a theory of the structure of matter; for the most natural view to take as a provisional hypothesis is that matter is just a collection of positive and negative units of electricity, and that the forces which hold atoms and molecules together, the properties which differentiate one kind of matter from another, all have their origin in the electrical forces exerted by positive and negative units of electricity grouped together in different ways in the atoms of the different elements."

The rest of Sir J. J. Thomson's address was occupied with speculations on the æther and a *résume* of the work recently done in radio-activity, particularly the bearing of the latter on medical science. An eloquent peroration, worthy of the great scientist, on the renaissance of scientific learning closed an address remarkable for its originality and interest.

A New Sodium Flame.

The following new device for securing a bright sodium flame is due, we believe, to the Rev. B. J. Whiteside of Stoneyhurst.

The gas on its way to the burner is led into a test-tube containing dry salt powdered very finely. The nozzle by which the gas enters passes through a cork, which permits it to be adjusted so as to be just above the salt. A lateral tube permits the exit of the gas to the burner. When the gas is turned on, the jet disturbs the salt dust, which is then carried forward to the flame. The result is a very steady and solid sodium flame. The rate of supply of salt can be adjusted by raising or lowering the nozzle. Sodium fluoride of calcined borax may replace the chloride. Other powdered substances may be used in a similar way for spectrum work.

The efficiency of the device depends upon the fact that fresh salt is being continually fed into the flame. It is a matter of common knowledge that when salt is first placed in a flame the yellow light is brighter than after an interval. It has been shown that the various lines in the salt spectrum are due to electrically charged particles moving in different directions, due probably to the breaking up of the molecules; and the salt is much more easily put into this state when first placed in the flame.

In practice it has been found that little or no choking of the burner takes place, most of the salt being blown out by the jet of gas.

Magnetism of Gases and Vapours.

In a dissertation, accepted by the University of Halle, R. Bernstein describes some experiments of his on the magnetic properties of gases. The experiments were conducted on the lines of Faraday's method. A glass bulb was suspended in a strong magnetic field from the one arm of a torsion balance and balanced by a counterpoise, and the torsion was measured. The bulb was in successive experiments filled with the respective gas vapour, with air, and evacuated; the magnetic susceptibility of air being known in absolute measure, the magnetic susceptibility of the gas in question could be deduced. At the end of his dissertation Bernstein suggests some improvements in the construction of the bulbs and of the torsion apparatus, of which he did not make use, however, in the determination of his constants. But he compensated for the diamagnetism of the glass, which complicates such experiments considerably, by placing near the bulb a paramagnetic body, paraffin or brass. The gases examined were purified with care. They were: carbon dioxide, oxygen, hydrogen, chlorine, the explosive mixture of chlorine and hydrogen, hydrochloric acid, and the vapours; ether, aqueous vapour, bromine, carbon, disulphide, and chloroform. As a rule the gas in the bulb was under a pressure of two atmospheres. Experiments with rarefied air were also made, and it would result that the magnetism of a substance as vapour and as liquid is the same for equal weights and equal temperatures. As regards oxygen, which is rather strongly paramagnetic (in the same sense as iron), Bernstein agrees with Faraday and Epimoff, whose figures do not differ much from those of Toepler and Henning and of Quincke. As regards carbon dioxide, which is very feebly paramagnetic (possibly diamagnetic), the agreement is less satisfactory; and the same holds for hydrogen, which seems to be very feebly diamagnetic. Most of the other substances which appear to be feebly diamagnetic had not been examined by other observers.—*Engineering.*

A Kinematical Illusion.

The following experiment, writes Mr. C. S. Jackson in *Nature*, is easily tried, and throws, I think, some light on a certain type of illusions. A small cog-wheel from an old American clock is the only apparatus required. Holding the axle in the finger and thumb of the right hand, give it a twirling motion, say, counter-clockwise. Let the teeth of the wheel click gently against a small card or the finger-nail of the left hand. On looking at the wheel the spokes appear to revolve counter-clockwise (as they do) and the teeth to revolve in the reverse direction.

Board of Education Examinations.

The Board of Education, Whitehall, has issued a memorandum calling attention to changes in certain syllabuses of examination for 1910 affecting students engaged in the engineering and building trades. As the changes which have been introduced in certain sections of the syllabuses in Subject I., Practical Plane and Solid Geometry; Subject Vp., Practical Mathematics; and Subject VII., Applied Mechanics, included in the forthcoming volume of syllabuses, are considerable, the Board wish to direct attention to this in advance of the issue of that volume. The changes aim at bringing the distribution of the subject matter of instruction and of examination more fully into line with the prevailing requirements in these subjects in relation to the building and engineering trades. They will be found to facilitate, on the one hand, more specific application of the teaching by illustrative examples drawn from the particular industries in which students are engaged, and, on the other, the more complete treatment of sections of these subjects, in which of late there has been much development.

NEXT MONTH

The first of a Series of Simple Scripture Lessons for Infants by

Mrs. Florence Kirk of Bradford.

PROFESSOR MEIKLEJOHN'S SERIES

GEOGRAPHY.

A NEW GEOGRAPHY ON THE COMPARATIVE METHOD. With Coloured Maps and Diagrams, and an Outline of Commercial Geography and full Index. By J. M. D. MEIKLEJOHN, M.A. **Thirty-eighth Edition (Revised).** Cr. 8vo, 630 pp. **4s. 6d.**

A SCHOOL GEOGRAPHY. With special reference to Commerce and History. With Maps and Diagrams. By J. M. D. MEIKLEJOHN, M.A., and M. J. C. MEIKLEJOHN, B.A. Crown 8vo, 410 pages. **Sixth Edition (Revised)** . . . . . **2s. 6d.**

A SHORT GEOGRAPHY. With the Commercial Highways of the World. **Thirtieth Edition (Revised).** By Professor MEIKLEJOHN. Crown 8vo, 196 pages . . . . . **1s.**

THE COMPARATIVE ATLAS. By J. G. BARTHOLOMEW, F.R.G.S., and Edited by Professor MEIKLEJOHN. **Seventh Improved Edition.** Containing 64 Plates and a General Index . . . . . **2s. 6d.**

THE BRITISH COLONIES AND DEPENDENCIES: Their Resources and Commerce. By M. J. C. MEIKLEJOHN, B.A. **Seventh Edition (Revised).** Crown 8vo, 96 pages . . . . . **6d.**

EUROPE: Its Physical and Political Geography. Page Map in Colour. By M. J. C. MEIKLEJOHN, B.A. 96 pages. **Fourth Edition (Revised)** . . . . . **6d.**

AUSTRALASIA: Its Geography, Resources, Commerce, and Chronicle of Discovery. Third Edition (Revised). By M. J. C. MEIKLEJOHN, B.A. Crown 8vo, 86 pages . . . . . **6d.**

ASIA: Its Geography, Commerce, and Resources. With Tables of Salient Distances and a Double-page Map in Colour. By M. J. C. MEIKLEJOHN, B.A., F.R.G.S. **Second Edition (Revised).** Crown 8vo, 96 pages . . . . . **6d.**

ENGLISH.

ENGLISH LITERATURE. A New History and Survey from Saxon Times to the Death of Tennyson. By J. M. D. MEIKLEJOHN, M.A. **Second Edition.** Demy 8vo, 650 + viii pages . . . . . **6s.**

"Both for general readers and for students this work should be of great service."—*The Literary World.*

THE ENGLISH LANGUAGE: Its Grammar, History, and Literature. By J. M. D. MEIKLEJOHN, M.A. **Twenty-eighth Edition.** Enlarged, with Exercises and Additional Analysis. Crown 8vo, 486 pages . . . . . **4s. 6d.**

THE ART OF WRITING ENGLISH. A Manual for Students. With Chapters on Paraphrasing, Essay Writing, Précis Writing, Punctuation, and other matters. By J. M. D. MEIKLEJOHN, M.A. **Sixth Edition.** Crown 8vo, 340 pages . . **2s. 6d.**

PRACTICAL PRÉCIS WRITING AND INDEXING. By J. BLAKE HARROLD, of H.M. Civil Service. Crown 8vo, 268 pages . . . . . Net, **2s. 6d.**

A SHORT GRAMMAR OF THE ENGLISH TONGUE. With 330 Exercises. **Nineteenth Edition.** By Professor MEIKLEJOHN. Crown 8vo, 176 pages . . . . . **1s.**

COMPOSITION FOR SCHOOLS AND COLLEGES. Based on Outline Essays, with Exercises in Style. By C. H. MAXWELL, B.A. **Third Edition.** Crown 8vo, 138 pages . . . . . **1s.**

FABLES, ANECDOTES, AND STORIES FOR TEACHING COMPOSITION. Tenth Edition. Arranged by Professor MEIKLEJOHN. Crown 8vo, 160 pages . . . . . **1s.**

A NEW SPELLING BOOK. With Side Lights from History. **Seventeenth Edition.** By Professor MEIKLEJOHN. Crown 8vo, 152 pages . . . . . **1s.**

THE SPELLING LIST. Being 10,000 Difficult Words for Civil Service and other Examinations. With a Key to Correct Spelling. **Eighth Edition.** Crown 8vo, 104 pages . . . . . **1s.**

HISTORY.

A NEW HISTORY OF ENGLAND AND GREAT BRITAIN. With Maps and Tables. By J. M. D. MEIKLEJOHN, M.A. **Twenty-third Edition.** Crown 8vo, 740 pages . . . . . **4s. 6d.**

A SCHOOL HISTORY OF ENGLAND. By J. M. D. MEIKLEJOHN, M.A., and M. J. C. MEIKLEJOHN, B.A., sometime Adam de Brome Exhibitioner, Oriel College, Oxford. **Fifth Edition.** Crown 8vo, 470 + viii pages . . . . . **2s. 6d.**

A SHORT HISTORY OF ENGLAND AND GREAT BRITAIN. 55 B.C. to A.D. 1890. **Twenty-fourth Edition.** Crown 8vo . . . . . **1s.**

OUTLINES OF THE HISTORY OF ENGLAND AND GREAT BRITAIN to A.D. 1890. Seventh Edition. Crown 8vo, 86 pages . . . . . **6d.**

MATHEMATICS.

A NEW ARITHMETIC. (Theoretical and Practical.) By G. A. CHRISTIAN, B.A. (Lond.), and G. COLLAR, B.A. (Lond.). **Fourteenth Edition.** Crown 8vo, 552 pages . . . . . **4s. 6d.**

"We recommend teachers and students to judge for themselves what a powerful auxiliary to success has been given them by the experience and judgment of the able authors."—*The Schoolmaster.*

A SHORT ARITHMETIC. By G. A. CHRISTIAN, B.A., and A. H. BAKER, B.A. **Fourth Edition.** Crown 8vo, 196 pages. (ANSWERS separately, **6d.**) . . . . . **1s.**

A NEW ALGEBRA. As far as the Binomial Theorem. **Including Chapters on Graphs.** By G. COLLAR, B.A., B.Sc. (Joint Author of "A NEW ARITHMETIC"). Crown 8vo, 438 + viii pages . . . . . **4s. 6d.**

"An able, careful, and attractive work."—*The Educational Times.*

A Complete Catalogue will be sent post free on application.

MEIKLEJOHN & HOLDEN, 11 Paternoster Square, London, E.C.

French Prize Competition.

1. All French translations **must be received not later than October 6, 1909,** and addressed to:—PRIZE EDITOR, Office of *The Practical Teacher*, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the *coupon* which appears on the Back Wrapper page of the current number. One coupon must be sent for each entry.
3. Competitors should write pseudonym only on MS. Prize-winner will be asked to send name and address for publication.
4. No competitor may take the prize offered more than once in three months.

A Prize of **Half a Guinea** is offered for the best rendering into English of the following extract:—

On trouve les mêmes difficultés quand on veut noter les élans fougueux du treizième siècle, ses poétiques inspirations, ses amoureuses et chastes visions, tout cela se détachant sur un arrière-fond de grossièreté, de misère, de corruption, et de folie. Les hommes eurent alors tous les vices, sauf la vulgarité, toutes les vertus, sauf la mesure; c'étaient des brigands ou des saints. La vie était assez rude pour tuer tous les organismes faibles; aussi les caractères avaient-ils une énergie inconnue aujourd'hui. A chaque instant il fallait se prémunir contre mille dangers, prendre de ces résolutions imprévues où l'on risque la vie. Ouvrez la chronique de fra Salimbene et vous serez effrayé de voir ce qui y occupe la plus large place, c'est le récit des expéditions annuelles de Parme contre les villes voisines ou des villes voisines contre Parme. Que serait-ce si cette chronique, au lieu d'avoir été écrite par un moine à l'esprit très ouvert, passionné de musique, voyageur infatigable, l'avait été par un homme de guerre? Et ce n'est pas tout, ces guerres de ville à ville se compliquent de dissensions civiles; des complots se trament périodiquement; les conjurés sont massacrés s'ils sont découverts, ou massacrent et exilent s'ils triomphent. Qu'on se représente tout cela dominé par les grandes luttes de la papauté contre l'empire, les hérétiques et les infidèles, et l'on comprendra bientôt combien il est difficile de décrire de pareils temps. L'imagination hantée de spectacles horribles ou délicieux comme ceux des fresques du *Campo Santo* de Pise, on pensait sans cesse au ciel et à l'enfer; on s'en informait avec cette fiévreuse curiosité des émigrants, qui sur le pont du bateau, passent leurs journées à se figurer le coin d'Amérique où dans quelques jours ils planteront leur tente. Tout moine un peu connu devait s'y être promené; le poème de Dante n'est pas une œuvre isolée; c'est le plus beau monument d'un genre qui avait suscité des centaines de compositions et l'Alighieri n'eut guère qu'à coordonner et à vivifier du souffle de son génie les travaux de ses prédécesseurs.

From Vie de S. François d'Assise, by PAUL SABATIER.

RESULT OF THE AUGUST COMPETITION.

The prize is awarded to "Kettering." (Will "Kettering" kindly forward name and address for publication?)

First Class.—Kim, Meadow-sweet, Clio, Colenso, Caterthun, Craigellachie, Alys, Nemo, K. A. M., Eclaireur, Knare, Amalia, Galloise, T. V. D., Ignis fatuus, Aroer, Pierrette, Fourmi, Skirrid, Oyster, Scholastic, Kram, Oiseau, Caliban, Cryf ffydd, Mena, Nelson, Abeille, Vaurien, Waverley, Carraway, Primevère, Witch, Mavis F. B., Physche, Wrecun.

Second Class.—Essex, Agesilaus, Toddy, Scixio, Amateur, La France, Jaune-rouge, Hard up, Arodocht, Lyads, Mussy, La jeune fille, De Serf, Joyce, June, Le pauvre petit.

REPORT.

It has been difficult this month to find a really good translation. "Kettering's" is the best, but it is open to obvious criticism in several points. Curious mistakes were made in several cases over *revient*, which was taken as if it were *devient*, and *déchéance* and *reconnaissance* proved to be difficulties in a number of cases.

PRIZE TRANSLATION.

With diabolical skill, affecting in turn hope or depression, according to the views of his interlocutors, discouraging some, inciting others, seeming to be of each one's opinion, and bringing each one round to his own, Fouché knew how to draw together for the same design, and push toward the same end, men of widely divergent opinions. To Liberals like La Fayette he said, "Napoleon is returning raving; he intends to dissolve Parliament and become Dictator. Shall you put up with this return to despotism? The danger is imminent. In a few hours Parliament will no longer exist. Words will not suffice." He informed the Emperor's partisans that excitement was intense in the Assemblée, that the majority seemed already won over to a proclamation of deposition as in the previous year. He insinuated that spontaneous abdication was perhaps the only way for the Emperor to avoid deposition, to preserve the country from invasion and dismemberment, and to save the dynasty. The sovereigns, who had only engaged in war in order to annihilate him, would stop their armies, and doubtless would not be averse to the recognition of Napoleon II. For the matter of that, the Duc d'Orante had let out that he had semi-official assurance of it through secret reports from Vienna. To other Bonapartists less easy to hoodwink he treacherously said that the Parliament was, above all, patriotic, and that in the public interest it would not withhold its co-operation from Napoleon; but that he ought to frankly confide in it, because in time of such great peril complete confidence between Emperor and nation was absolutely necessary. By these manipulations Fouché made abdication almost inevitable, and at the same time he safeguarded himself against contrary events. If Napoleon kept in power Fouché would find firm supporters amongst the household of the sovereign whom he would have done his best to dethrone.

"KETTERING."

PLOVER AND BOBOLINK.

IN the *Atlantic Monthly*, Mr. D. Lange calls attention to the vagrants of plover and bobolink:—

"Like true globe-trotters, they are fond of varying their route, and most of them return to North America by a way quite different from that by which they left it. Twice a year they fly 8,000 miles, once north and once south; and their northward route lies 3,000 miles west of their southward route. Every year of his life, therefore, a golden plover travels 20,000 to 22,000 miles.

"The bobolink is also a gad-about, but not such an inveterate one as the golden plover. He does not, for instance, go nearly so far north; and, instead of leaving North America, as any one would expect him to do, by Mexico and the Mississippi Valley, he does so *vid* the Carolina rice-fields, where he is known as the rice-bird, and is a great pest to the rice-growers. As it is, he eats up a great deal of rice, and were not large sums spent in protecting the fields against him he would probably eat it all up. After growing fat on rice, he leaves for Cuba, then for South America, the Amazon basin, and Southern Brazil. What is also very strange is that the birds can stand such immense variations of climate—dry and damp, and hot and cold."

J. M. DENT AND CO.'S NEW BOOKS.

IMPORTANT ANNOUNCEMENT OF A NEW EDITION OF

DENT'S FIRST FRENCH BOOK. By S. Alge and Walter Rippmann.

Twentieth Edition, with many new features and improvements. Price 2s. Messrs. Dent & Co. would direct the attention of teachers to the numerous improvements effected in the latest edition of this book. The entire work has been reset in good, clear type. Coloured Illustrations of the Season Pictures and the French Coinage are now included. Mr. Norman's Supplementary Exercises are now included, and will be found extremely useful. It should be distinctly understood, however, that the text has in no way been altered, thus allowing both editions to be used side by side.

Three Phonetic Charts. Size 30 × 30 Inches.

Unmounted, 1s. net each. Mounted on Linen, 2s. 6d. net each.
Mounted on Linen, with Rollers, 3s. 6d. net each.

THE SOUNDS OF ENGLISH.
LES SONS DU FRANCAIS. DEUTSCHE LAUTE.
Arranged by Walter Rippmann.

EPISODES EN ACTION. With a Phonetic Transcript. By J. Stuart Walter. Price 1s. 4d.
"Real French dialogues, excellent in conception and educationally very valuable."—London Teacher.

A FRENCH PHONETIC READER. By S. A. Richards, B.A. 1s. 6d.
A careful and well-graded selection of passages in prose and verse.

LES FEUILLES D'AUTOMNE DE VICTOR HUGO. Edited by H. C. Norman, B.A. *[In the Press.*

L'ENTENTE CORDIALE A LA CAMPAGNE. By Clemence Saunois. Price 1s. 6d.

GERMAN GRAMMAR AND WORD-FORMATION. Exercises. With an Abstract of the Essentials of German Grammar. By Walter Rippmann, M.A. Price 1s. 8d.

A FIRST BOOK OF GERMAN POETRY. Compiled and Annotated by Walter Rippmann. Price 1s. 4d.
"A praiseworthy and important addition to Dent's Modern Language Series. The 102 selections have been chosen with judgment and care from various authors, and are here conveniently arranged according to subjects."—*School World.*

THE TEACHING OF ENGLISH COMPOSITION. By Miss E. E. Coverntон. Price 1s. 6d. net.

DENT'S SCIENTIFIC PRIMERS. Edited by Dr. J. Reynolds Green, F.R.S.

With numerous Illustrations. Cloth. Price 1s. net each volume. The first three volumes of this important series are now ready—viz., Botany, Biology, and Chemistry, and will be followed shortly by those dealing with Astronomy, Geology, Zoology, and Physiology. A detailed prospectus, giving the aim of the series and names of the editors, can be had of the publishers.

DENT'S OPEN-AIR NATURE BOOKS.

With many charming Illustrations in Colour and Half-tone. Price 8d. each. *Some Press Appreciations:*—"How such coloured plates can be given at so low a price we are at a loss to imagine....They will be without rivals in their particular sphere."—*Guardian.* "From cover to cover the book is intensely fascinating, and children will be at once enthralled, particularly those with a bent for Nature Study. It has seldom been our privilege to see more excellent illustrations than are to be found in this book."—*The Teacher.*

1. The Hedge I Know.
2. The Pond I Know.
3. The Wood I Know.
4. The Meadow I Know.
5. The Stream I Know.
6. The Common I Know.

Full particulars of the above books and many other recent Educational Works may be had post free from Messrs. Dent & Co.

London: J. M. DENT & CO., Aldine House, Bedford St., W.C.

W. & A. K. JOHNSTON, LIMITED.

NEW SERIES OF BATHY-OROGRAPHICAL MAPS.

NOW READY.

INDIA (47 miles to an inch). 1 : 3,000,000.
NORTH AMERICA (114 miles to an inch). 7 : 200,000.
SOUTH AMERICA (100 miles to an inch). 6 : 366,000.
BRITISH ISLES (14 miles to an inch). 1 : 875,000.
AFRICA (133 miles to an inch). 1 : 8,400,000.
ASIA (145 miles to an inch). 1 : 9,131,300.

PRICES, on Cloth, Rollers and Varnished, **12/-**; or to Fold, **as recommended by the Geographical Association, 12/-.**

OTHERS IN ACTIVE PREPARATION.

The Publishers invite teachers to apply for Specimen Map and Prospectus giving full particulars of this fine series of maps.

6 PATERNOSTER BUILDINGS, LONDON, E.C.; and at EDINBURGH.

J. POOLE & CO.

Established 1854.

104 Charing Cross Road,

LONDON, W.C.

ENQUIRIES BY LETTER RECEIVE IMMEDIATE ATTENTION.

SCIENTIFIC and EDUCATIONAL BOOKS,
New and Second-hand.

LARGEST STOCK IN LONDON
of Second-hand School, Classical, Mechanical, Elementary, and Advanced Scientific Books at about
HALF PUBLISHED PRICE.

Mathematical, Theological, and Foreign Books.

A COURSE IN HISTORY AND LITERATURE.

SCHEME FOR OCTOBER.

BY MABEL A. BROWN.

GRADE I.	GRADE II.	GRADE III.
History—		
The coming of the Romans (54 and 55 B.C.).	Rome and the Romans.	Biography of Julius Cæsar.
Story of Caradoc.	Britain and the Romans.	Biography of Julius Agricola.
Story of Boadicea.	A day in Roman Britain.	Roman builders and road-makers.
What the Romans did in Britain.	Famous Romans—Cæsar, Agricola, Tacitus, Titus, etc.	Roman remains in Britain—implements, buildings, coins, pottery; effect on language.
The departure of the Romans.		
Literature—		
Stories of King Arthur.	The Coming of Arthur.	Story of Sir Tristram.
Excalibur, the famous sword.	Story of Sir Gareth.	Lancelot and Elaine.
Sir Gawaine and the Green Knight.	Balin and Balan.	(Any left over from September.)
Geraint and Enid.	The Passing of Arthur.	The Passing of Arthur.
Poetry for Recitation—		
Selected short passages from Idylls of the King—for example, the first twelve lines of Morte d'Arthur.	Selected short passages from Idylls of the King.	Boadicea. (Cowper.)
	Verses from the Lady of Shalott.	Selected passages from Idylls of the King.
		The Lady of Shalott. (Tennyson.)
		Sir Galahad. "

Books to Read.

Stirring and True, "A Warrior Queen" (Collins, 6d.); *Boys and Girls of Other Days*, "Coming of the Romans" (A. and C. Black, 1s. 4d.); *Beric the Briton*, by Henty (Blackie, 6s.); *Count of the Saxon Shore*, by Church.

Books to Study.

Illustrative History I. (H. Marshall, 2s. 6d.); *History Teaching by Biography* (Charles and Dible, 2s. 6d.); *English History from Original Sources I.* (Blackie, 2s.); *The Making of the English Nation I.* (Blackie, 1s.); *Britain and Germany in Roman Times* (Blackie, 6d.); *Highroads of History I. to IV.* (Nelson); *Morte d'Arthur*, by Malory (various publishers); *Idylls of the King*, by Tennyson; *Cæsar's Gallic War*; *Tacitus' Annals* and *Julius Agricola*.

Pictures for Class-Teaching.

A. L. Historical Incidents No. II.—Caractacus before Claudius (set of 6 for 13s. 6d.); *Britannia Historical Pictures No. I.—Hadrian's Wall* (2s. 6d.): the former published by Arnold, Leeds; the latter by Arnold, London.

Pictures—Shown to the Children (from Nelson's "Highroads of History.")

Hunters and Traders, by Lord Leighton; *Druids on New-Year's Day*, by Robert Hope; *Foes from Afar*, by Thomas Davidson; *Caradoc at Rome*, by G. F. Watts—Vol. I. *Passing of Arthur*, by Robert Hope; *Tristram at Arthur's Court*, by William Dyce; *Forum at Rome; King Arthur*—Vol. II. *Boadicea's Statue* (London); *Roman Emperor visiting a Pottery in Britain*, by Alma Tadema—Vol. III. *Building the Great Wall*, by William Bell Scott; *First Invasion of Britain*, by Edward Armitage; *Romans building a Fort*, by Ford Madox Brown—Vol. IV.

In addition to these there are several well-known pictures illustrating incidents in the Arthurian story, such as *Elaine in the Tower*, *Lady of Shalott*, Watts's *Sir Galahad*, etc. Large copies are also sometimes seen of some of those mentioned as contained in *Highroads of History*.

Once the children's interest is excited in these true stories of olden times, they will be delighted to bring to school any pictures they find bearing on the period. As I suggested last month, a special wall sheet should be kept for these, where the pictures should be arranged in series. The Goss china which so many people collect contains some splendid models of Roman pottery—ewers, vases, and jugs of various shapes, bottles, etc. Teachers whose schools are situated in large towns should not forget the local museum and reference library when studying their history month by month.

GENERAL NOTES ON THE SCHEME.

History.—The history of this period deals entirely with the Roman invasion and occupation of Britain and the changes made by the Romans, both temporary and permanent, chiefly—

(*a*) *Military Rule.*—Stamping out internecine wars and dividing the country into five provinces.

(*b*) *Civil Administration.*—In the large cities self-government was taught, and many elements of the Roman civil system.

(*c*) *Improvement of the Land.*—Building roads, walls, theatres, baths, temples; draining marshes and clearing forests; opening up mines and introducing agricultural improvements.

(*d*) *Influence on the Language.*—Trace in many words in use now, especially in names of old towns.

I have suggested for each grade the kind of historical teaching that seems suitable, keeping to the story-telling type of instruction for Grade I., using the law of contrast and comparison for Grade II., and making use of biography and growth of civilisation for Grade III. The geography of Great Britain at this period should be studied in close connection with the history.

Works by JOHN CARROLL,

ART MASTER AND EXAMINER IN DRAWING.

Approved by the Science and Art Department of the Board of Education.

Practical Geometry for Art Students.

A New Edition, in which the examples dealing with Practical SOLID Geometry have been entirely remodelled. The projections of points, lines, and traces, etc., have given place to those of SIMPLE OBJECTS, the latter being of more practical use to the Art Student. Strongly bound in cloth, **1s. 6d.**

"No private student needs a better book, and no teacher could place a more trustworthy text-book in the hands of his pupils."—*Practical Teacher.*

A Key to Carroll's Geometry.

Consisting of Solutions to all the Exercises in Solid Geometry of Objects of Simple Form, for the use of Students of Geometrical Drawing (Art). New Edition. Cloth, **1s. 6d.**

Drawing from Models and Objects.

A Handbook for Teachers and Students in Training.

Crown 8vo, cloth, **2s. 6d.**

"It may be confidently recommended either as a drawing master's note-book or as 'A Handbook for Students in Training.' It is well arranged, the directions are clear, and the illustrations are numerous and good."—*School Guardian.*

Pattern Drawing and Design.

An Application of Practical Geometry to the Construction of Ornament. Strongly bound in cloth, **1s. 6d.**

"The teacher of design has in this book an excellent guide, which can be used in all stages of a pupil's progress. The examples are ingenious and well printed. They are, in a good many cases, quite new to us in books of this character."—*Schoolmaster.*

Freehand Drawing of Ornament.

Consisting of Twenty-four Photographic Reproductions of Examples of Ornament, and Sixty-eight Analytical Diagrams of Construction, Designed and Arranged in Graduated Order, with Directions to the Student. Demy 4to (11 in. by 8 in.). In stiff wrapper, price **1s. 6d.**

"Excellent examples, beautifully and clearly printed, are the distinguishing features of this book. In addition to the finished examples, three progressive stages are given, showing the gradual development of the ornament. No student can need a better book."—*Practical Teacher's Art Monthly.*

Drawing of Foliage, Flowers, & Fruit, and Foliated Design.

Consisting of Twenty-four Reproductions of Photographs from Nature by WM. J. CARROLL. With Directions to the Student, and forty Examples of FOLIATED DESIGN by JOHN CARROLL. New and enlarged edition, demy 4to (11 in. by 8 in.). In stiff wrapper, **2s. 6d.**

"Can be recommended to designers as well as to students of drawing and painting."—*Architect.*

Works by F. F. LYDON.

Nature Lessons with the Blackboard.

Crown 4to, stiff boards, cloth back, **3s.** net (postage 4d.).

"The lessons comprise 16 on Plant Life, 14 on Animal Life, and 15 on the Comparison of Animals. The notes, are full, good, and helpful, and are furnished with forty-three full-page plates. The drawings are admirable, simple enough to be readily reproduced on the blackboard, and with sufficient detail to be extremely useful to the children."—*Head Teacher.*

Floral Design in Colour.

In Two Sets. Price **1s. 6d.** net per Set (postage 2d.).

This work consists of Two Packets of Cards, printed in Colours, and gives a Progressive Course in Elementary Design.

Catalogue of School Books, Stationery, and General School Supplies post free on application.

BURNS & OATES, Ltd., 28 Orchard St., London, W.

THE Invicta Number Scheme.

By J. W. LADNER, L.C.P.

A method of teaching the fundamental principles of arithmetic by a constant reference to our decimal system of notation, through the media of eye and hand as well as ear.

It is the outcome of much careful experiment and long experience, having been repeatedly tested and revised in actual class teaching. It aims at removing many of the difficulties always encountered in teaching the elements of Arithmetic to young children.

The principles and methods of the Scheme are fully explained in the

Invicta Number Scheme Handbook

with the aid of numerous illustrative diagrams; this Handbook affords a complete guide to the system.

For the Teacher.

PRICE 8d. net; by post, 9d.

The Invicta Number Board.

An invaluable accessory for the teaching of Arithmetic practically. By its use children may learn appreciation of number concretely, through handling and seeing, as well as saying and hearing.

SIZE, 14½ inches by 11 inches, with slate-surface, printed in silver and red: the back of the board has a plain slate-surface to enable it to be used for freearm drawing.

PRICE, with plain edges, **6s. 6d.** per dozen; with edges cloth-mounted, **8s. 6d.** per dozen.

Detailed Prospectus on application.

London: GEORGE PHILIP & SON, Ltd., 32 Fleet Street, E.C.

NOTICE TO EDUCATION AUTHORITIES & TEACHERS

Now Ready.

"THE RED CODE," 1909

WITH REGULATIONS FOR ALL TYPES OF SCHOOLS (INCLUDING THE NEW PROVISIONS RESPECTING STAFFING AND GRANTS FOR ELEMENTARY SCHOOLS), EDUCATION ACTS, EDUCATION CLAUSES OF CHILDREN ACT, CIRCULARS ON MEDICAL INSPECTION, Etc., Etc.

Annotated and Indexed by J. H. YOXALL and ERNEST GRAY.

The Best School Guide for Local Authorities, Managers, and Teachers.

Price ***1s.*** net; post free, ***1s. 3d.***

Orders now received by the

SCHOOLMASTER PUBLISHING CO., Ltd.,

3 RACQUET COURT, FLEET STREET, E.C.

"THE COMPANION TO THE RED CODE," 1909

Will be published when the necessary official documents are issued. See Advt., p. xlviii. of "The Red Code."

For this purpose *The Britannia Historical Geography Books, Part I.*, will be found very useful. They are published by Messrs. Charles and Dible at 3s. per dozen, and contain several maps that deal with our period this year. The same firm publishes the "*Suggestions*" *Historical Drawing Cards, Set A—Ancient Britons to Anglo-Saxons* (1s. 6d.). This set of cards well illustrates the history of this period, and provides suggestions for handwork, especially drawing of Roman buildings, pottery, lamps, etc. *The Historical Geography Books* should be used by the children in Grades II. and III., while for Grade I. large blackboard maps should be made. Messrs. E. J. Arnold's *A. L. Historical Cards* will also be found very useful for study by the children. Two of these—(1) *Landing of Julius Cæsar*, (2) *Hadrian's Wall*—come into this month's work and give very valuable details. *The A. L. Freehand Outlines of Famous Men, Book MC.* (2s. per dozen), are all taken from authentic sources, and contain pictures of Julius Cæsar, William the First, Richard the First, and Chaucer, all of whom come into our period.

Every opportunity should be taken of studying any Roman remains in the neighbourhood. This outdoor work should supply material for handwork, elaborating rough sketches, studying architectural features, designing after the style of Roman tiles, mosaic, etc., and map-making. Grade III. in particular should study the effect of the Roman occupation in present-day English, making lists of places the names of which point to a Roman origin.

Literature.—The Arthurian stories are chosen for all grades this month. If the teacher will really study Malory's prose and Tennyson's poetry and make the styles his own, his pupils cannot fail to be delighted as well as elevated by the literature lessons. Each grade should commit to memory some passages, however short, from the *Idylls of the King*. If the teacher's own private reading is done with a pencil and notebook at hand, he can jot down suitable passages as he comes to them. Boys' and girls' teachers will naturally choose differently, but there is ample material for selection: sweet, mild maidens, bold and gallant knights, wars and tournaments, palaces and castles, a good and gracious king—all these appeal irresistibly to our children, especially when clothed in Tennyson's bright garb, and they will love to repeat the chosen passages.

For people who like to plan their work well in advance I mention that the following books will be used next month among others: Bede's *Ecclesiastical History*, Palgrave's *History of Anglo-Saxons*, *Story of Beowulf*, *The Viking Age*, *Northern Sagas*, *Balder Dead* (Matthew Arnold), *Saga of King Olaf* (Longfellow).

SAMUEL JOHNSON AS JOHN BULL.

He was John Bull himself. He exalted the character, of which he may be regarded as its sublime type, but he embodied the spirit. His Toryism was part of his John Bullism; his love of London was rather that of the John Bull than the cockney; his hatred of Scotland was that of the John Bull of his youth. When Foote threatened to caricature him, he furnished himself at once with an oaken cudgel. He asked the price of one, and, being told sixpence, demanded a shilling one. "I'll have a double quantity." Could anything be more John Bullish than this? Physically and combatively, he embodied the character, not of the ordinary agricultural but of the literary John Bull.—*Lord Rosebery at Lichfield.*

A TALE FOR THE STORY HOUR.

THE STORY OF AN "OKOSAMA."

BY KEN HOSHINO.

IN the latter part of May last year I was born in a small village in Japan. The day of my birth was celebrated at my master's house, and as on every other happy occasion, they cooked "Kowameshi" rice with red beans to distribute amongst their neighbours, and also to offer to their gods, whom they prayed devoutly that I might grow up well and strong. The children of my master came back from their schools to take part in nursing me. I was highly honoured from the very beginning of my existence. I was called "Okosama," or honourable child. My existence as "Okosama"

lasted for about five weeks. Yet, what great pain had I given to my master! What anxiety had I given to him and to his family! How many a night had they spent without sleep. How many times had they invited the village doctor to look at my condition. How cheerful did they look when I was well, and how downheartened were they when I was not quite well. It is impossible to tell about all the kindness and tenderness which they bestowed upon me. The following is only a glimpse of their tender care for me.

As soon as I was born I was put on a soft bed in a bamboo basket together with ten thousand of my brothers and sisters. We were fed with very small fragments of mulberry leaves seven or eight times in

BURLINGTON CORRESPONDENCE COLLEGE.

Principal—Mr. J. CHARLESTON, B.A.
(Honours, Oxon.; and Lond.)

THE STAFF includes Graduates of London, Oxford, Cambridge, and Royal Universities, Prizemen, Scholars, etc.

Method on a thoroughly individual system, which ensures the closest attention to the needs of each candidate. Full corrections of papers, with time-saving notes, criticisms, summaries, and solutions.

DEPARTMENTS:—

1. **London Matriculation, Intermediate Arts, and B.A. Exams.**
2. **Intermediate Science and B.Sc. Exams.**
   In Theoretical Subjects only; Mathematics, Mechanics, Mathematical Physics, etc.
3. **L.L.A.** (Degrees for Ladies, St. Andrews.)
4. **Science and Art Exams.**
   Mathematics, Mechanics, and other Theoretical Subjects.
5. **A.C.P. and L.C.P.**

For Terms, Testimonials, etc., address
THE PRINCIPAL,
Burlington Correspondence College,
BIRKBECK BANK CHAMBERS, LONDON, W.C.

JUST PUBLISHED.

A TEXTBOOK OF BOTANY FOR STUDENTS.

With Directions for Practical Work.

By AMY F. M. JOHNSON, B.Sc., Lecturer in Botany at Cheltenham Ladies' College. With Illustrations by W. L. Boys-Smith, late Scholar of Girton College, Cambridge, and Science Lecturer at Cheltenham Ladies' College, and E. M. Berridge, B.Sc., F.L.S., and others. Crown 8vo, cloth. 500 pages. 400 Illustrations.

Price 7s. 6d.

Application should be made now for Specimen Pages, which will be ready shortly.

London: ALLMAN & SON, Limited, 67 New Oxford Street, W.C.

BOOKS FOR THE NEW TERM

THE COMPLETE FRENCH READER.

Compiled after that of F. AHN by A. DUBUVANT. Revised, with Additions, and Edited with English Notes, by C. A. THIMM. Sixth Enlarged Edition. Demy 8vo, cloth, **1s. 6d.**; wrapper, **1s.**

RULES OF FRENCH GRAMMAR AT A GLANCE.

For Teachers and Students. By O. F. CAMPHUIS. Being a Summary of the Difficulties of the Language, in a Practical and Simplified Form, as a Text-book for use in the Class, and in preparation for Examinations. Demy 8vo, cloth, **1s. 6d.**; wrapper, **1s.**

"May be recommended to candidates who are revising their work for examinations."—*The Journal of Education.*

Write for the (A) Catalogue.
SOLD BY ALL BOOKSELLERS.

London: E. MARLBOROUGH & CO., Publishers, 51 Old Bailey, E.C.

THE EARTH'S SURFACE IS NOT

STRAIGHT LIKE THIS

BUT

MOUNTAINOUS LIKE THIS.

To Teach Physical Geography, Geology, Topography, and Typical Earth Features, do not use a flat map but an accurate RELIEF map of a Typical District.

A HYPSOMETRICAL MAP OF INGLEBOROUGH

Constructed in Adamantine and

Prepared by
J. FOSTER STACKHOUSE, F.R.G.S., F.R.S.G.S.

70/- NET. Carriage paid to any address in Great Britain.

Length, 3' 11". Breadth, 3' 7". Height, 0' 8".
Weight approx. 56 lbs. District represented, 42 square miles.

THE GEOGRAPHICAL MODEL WORKS,

EMERSON CHAMBERS,
BLACKETT ST., NEWCASTLE-ON-TYNE.

Complete (4th) Edition. 416 pages. 2/6 net.

Book-keeping Down to Date.

By A. MUNRO, F.C.I.S., Dual Medallist, Society of Arts. Outstandingly modern, and best value on the market. Touches every possible phase of the subject.

ENTIRELY NEW ELEMENTARY EDITION.

144 pages. 1/- net. The ideal book for beginners. Full of short and nicely graded exercises.

Teachers write A. MUNRO, Author, Larbert, N.B., for particulars.

London: Eff. Wilson. Glasgow: W. & R. Holmes.

HISTORY DAY BY DAY.

Compiled by F. W. GREEN, F.R.Hist.Soc.

THE AIM OF THIS BOOK IS

(1) To provide the Teacher with material to place before his scholars descriptive of Historical Facts; (2) to provide short readings to illustrate the History or Literature Lessons, and (3) to introduce well-known Authors to the notice of the Scholar.

This book seeks to supply at least one inspiring memory for every day in the year.

The School Guardian says: "This novel book is an historical calendar in which each day has its own page. The idea ought to prove useful and suggestive to schoolmasters as a starting-point for little historical discussions."

Price 3/6 net in cloth gilt; by post, 3/9.

Stead's Publishing House, Bank Bdgs., Kingsway, W.C.

twenty-four hours at regular intervals. Our room was kept at a certain temperature, generally about 70° Fahrenheit, very often by means of artificial heat. The room was kept absolutely quiet, so that we might not be disturbed. We disliked mice and flies more than anything else, so our protectors took great care to shield us from the attacks of these harmful creatures. Moreover, thinking that the mention of "mice" or "flies" might irritate us, they never uttered these detestable words in our presence. If you know how small and delicate we all were, you will not be surprised why we were in so great dread of them. Our size was only that of the smallest ant when we were born. We grew up rapidly; so much so, that our size was doubled daily, and our master increased the number of baskets as we grew. At the end of the seventh day there were seven baskets, though a number of our brothers and sisters died either through sickness or accident. Had we been left in one basket we should have felt crowded, and could not have moved freely even on the day after our birth. Besides these cares, our master took special precautions in regulating the atmosphere of our room. When it was too dry, our master sprinkled water on the roof; and when it was too moist, he sprinkled millet chaff over us. On a wet day our bed was altered several times.

Thus, knowing neither what hunger or thirst means under the unspeakable kindness of our master, we grew up to the age of seven—a day to us corresponds to a year of mankind. At the end of the seventh day we became motionless. Our appetite left us as if we had been dead. Our master, thinking that we were fast asleep, took advantage and rested during twenty-four hours. For us, however, this was not at all rest. We had to struggle for about twenty-four hours (it may take much more if the weather is wet) in order to put off our old coats and to come out freshly clad. Our struggle was invisible to the human eye, yet it was extremely great, and some of us perished in this struggle. I came out, fortunately, quite triumphantly with a new coat. We were almost mad with excitement and wild with hunger. But our master, who knew how to take care of us when we were in an abnormal condition, fed us scantily on the day of our "waking," but increased the amount of our food daily. As soon as we came out of the old coat, we passed from the first stage to the second. We were also said to have been transformed from "lions' children" to "hawks' children." Our existence in the second stage was almost the same as that of the first, only we did not require such frequent meals now as before. We grew in absolute health for another seven days. Then suddenly we became quiet as before. This was simply the repetition of the former experience. After having a struggle less difficult we came out of our coat, beautifully clad, and were now termed the "children of the boat." Seven days later we repeated the same transformation and entered on the final stage, in which we were called the "children of Niwa," or the garden. Now we became grown-up caterpillars. Our master began to feed us with whole mulberry leaves, often together with their stems. We now spent the uneventful yet happy seven days of our mature life. At the end of this week we had become as large as a child's little finger. But gradually our bodies began to dwindle and to become more and more transparent with the silk which we were all destined to build into our individual houses called cocoons. My desire for food had entirely disappeared, and all I wanted was to find the most suitable spot to start my life's work. Seeing that the proper time had come, our master removed me, together with several hundreds of my comrades, to an "Agekago" from the basket where we had been fed. The Agekago is a basket in which dried reeds are spread in a zigzag fashion to a height of five or six inches. As soon as I was put into the basket, I climbed up between several of the reeds and commenced to spread my silk fabrics. The more I poured out the silk the smaller I became, and by the time I had completed my work, at the end of four or five days after its commencement, I was a small "Sanagi" or chrysalis about half an inch high. Now I sat quietly in the house I so patiently built, and waited eagerly for the hour of my martyrdom.

It was on a warm day that our master picked me up from the reeds, together with a few hundred of other

first-class cocoons. There were quite a few deformed cocoons which our master could not use profitably, and which he took away from our highly honoured company. Some of the lazy fellows had not made separate cocoons, two worms having combined their efforts in making a cocoon. Such cocoons, though very large, were very poor in quality, and could not be classified as first class. Now I and about four hundred of the best class cocoons were put into a measure box, and were then plunged into boiling water. This was the end of my life as a silkworm. My frail body, which had been subjected to hunger and thirst, disappeared, and my entire being was transformed into a higher substance—silk—in its purest form. It was the death of my former self that

NEW PUBLICATIONS

THE PRACTICE OF INSTRUCTION

A Manual of Method General and Special. Edited by JOHN WILLIAM ADAMSON, B.A., Professor of Education in King's College, London; Examiner in Education to the Universities of London, Durham, and Liverpool, to the College of Preceptors. Cloth, 536 pp., price 4s. 6d. net; post free, 4s. 10d. net.

NOTE.—A Prospectus, showing the scope and structure of this important new work on Method, and giving Specimen Pages from its various sections, and Extracts from Press Notices of the work, will be sent on application.

NEW METHODS IN THE JUNIOR SUNDAY SCHOOL

Based on Froebelian Principles. By HETTY LEE, M.A., late Scholar of Newnham College, Cambridge, Mathematical Tripos. With Twelve Illustrations from Photographs, and Notes of Fifty-two Lessons for Children under nine years of age to follow the Course of the Church's Year. Cloth, price 1s. 6d. net; post free, 1s. 9d. net. Two copies, 3s. 4d. net. Three copies, 4s. 11d. net. Five copies, 8s. net. Ten copies, 15s. 9d. net. Twelve copies, 18s. 10d. net.

A CYCLE OF NATURE STUDY

Being Suggestions for Nature Study in Town and Country Schools for Children under Twelve Years of Age.

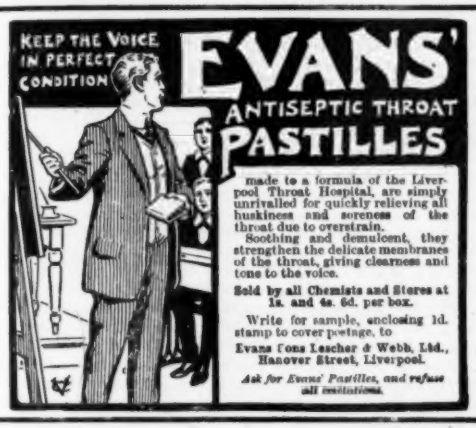
By M. M. PENSTONE. Illustrated. Cloth, price 3s. 6d.

THE SCHOOL GUARDIAN

AN EDUCATIONAL NEWSPAPER AND REVIEW.

Price 1d. Weekly; 1½d. by post. 1s. 10d. for Three Months. 3s. 6d. for Half Year. 6s. 6d. Yearly.

London: NATIONAL SOCIETY'S DEPOSITORY, 19 Great Peter Street, Westminster. S.W.


KEEP THE VOICE IN PERFECT CONDITION
EVANS'
ANTISEPTIC THROAT
PASTILLES
made to a formula of the Liverpool Throat Hospital, are simply unrivalled for quickly relieving all huskiness and soreness of the throat due to overstrain.
Soothing and demulcent, they strengthen the delicate membranes of the throat, giving clearness and tone to the voice.
Sold by all Chemists and Stores at 1s. and 4s. 6d. per box.
Write for sample, enclosing 1d. stamp to cover postage, to
Evans Sons Lescher & Webb, Ltd., Hanover Street, Liverpool.
Ask for Evans' Pastilles, and refuse all imitations.

DELICIOUS COFFEE

RED WHITE & BLUE

FOR BREAKFAST & AFTER DINNER.

In making, use less quantity, it being so much stronger than ordinary COFFEE.

NELSON'S ROYAL WALL ATLASES.

The ROYAL WALL ATLASES are to be found in almost every school in the kingdom. Their value as teaching and test maps is very well known.

Each Atlas consists of a set of maps attached to a roller in the manner generally adopted for Reading Sheets. Each map is printed in colours, on strong Manilla paper.

The following are included in the Series:—

INTRODUCTORY.
THE BRITISH ISLES.
EUROPE.
BRITISH EMPIRE.
BIBLE LANDS.
AMERICA.
ASIA.
AFRICA.
THE WORLD.

****** Complete List of the Series, post free.***

THOMAS NELSON AND SONS, London, Edinburgh, Dublin, and New York.

brought about this glorious present life. Had my former life been preserved, the work which the world so highly prizes would have been destroyed!

When our bodies became soft in the water, a maid took the pail from the fire and placed it on her seat. She began to spin several of our bodies together. She wound and wound her skein, singing :—

"Shi-zu-no-me-ga
Ma-go-ko-ro-ko-me-shi
Ku-ri-i-to-mo,
Tsu-mu-ge-ba-tsu-yo-shi
Ku-ni-no-to-mo-zu-na."

"Even a tiny thread which a country maid has spun
May become a mighty rope which sustains her nation's life."

How happily did I feel as I heard this song. Her voice sounded to me fainter and fainter as miles and miles of thread swelled the skein. In three hours' time all of us were spun into a single thread. Henceforth I did not exist as an individual, but was absorbed into the larger unit. From this period up to the present day I passed through many different stages. I was several times reeled and re-reeled till I was woven into this form—a cloth of silk.

APPENDIX.

Once upon a time there was a king in China who had a beautiful daughter called Konshikihime. She was so beautiful and so good that her popularity among the people overshadowed that of the queen, her stepmother. The more the beauty and kindness of the princess was sung by the people, the more the queen looked upon her obedient daughter with disgust and hatred. Thinking that her unpopularity was caused, not by her own wickedness, but by the beauty of the princess, the queen decided to get rid of her. Secretly, she ordered her servant to leave the princess in a lion's den. But the gruesome animal did not only leave the girl unhurt, but even brought her safely back to the palace. The queen in great wrath ordered her to be exposed on a mountain on which many hawks dwelt. The birds, like the lion, took her back to her palace. Again the queen sent her to an unknown sea, but again she was brought back to the capital by a fisherman who rescued her from peril. The queen's patience was now exhausted, and she ordered a wicked servant to bury the princess alive in the king's garden.

All this while the king had been kept in ignorance of his wife's perfidy. He thought that his child had been snatched away from the palace by his enemy. In great sorrow he was one evening taking a walk in the garden. In a dark corner of the garden he saw a strange tree which he had never seen before. Then he heard soft sounds come from the branches of the tree. He looked up, and lo, he found hundreds of small transparent creatures which were busily engaged in surrounding themselves with silky fabrics. Motionless, he stood before the tree in wonder and awe. Suddenly the trunk of the tree opened, and there appeared the princess enshrouded in mist, who told him of her fate, and supplicated him not to disturb the tree, nor the worms who her soul embodied. Furthermore, the princess told him how to take care of the silkworm, and how to use the cocoon for the benefit of her people whom she so devoutly loved. The king sorrowfully followed the instructions of the princess, and thus silk culture began in China, then in Japan.

And so the four periods of the life of a silkworm are called by the four different names—lion, hawk, boat, and garden.

A HYPSOMETRICAL MAP OF INGLEBOROUGH.

THE ordinary scholar is particularly apathetic as regards geology and geography, which may possibly be due to the methods by which it is generally taught. There is nothing particularly inspiring in the discrimination, on paper, between the old red sandstones and the shales, or the study of the ordnance survey map. Something more vivid and graphic conveying the impressions to be derived from actual study of Nature has to be supplied before the true lessons of the formation of the earth's crust can be taught.

It is therefore interesting to note the particulars of a useful hypsometrical or relief map of the district of Ingleborough, near Settle, which Professor Hughes, who occupies the Chair of Geology at Cambridge University, has pronounced to be the most interesting spot, so far as he is aware, geologically speaking, in the world. This map or model has been constructed by Mr. J. Foster Stackhouse, F.R.G.S., F.R.S.G.S., and its peculiar merit, as contrasted with a considerable number of geographical models which have from time to time been constructed, is that, so far as can be ascertained, it is correct within two feet of the actual district dimension at every portion of the model. In other words, the greatest inaccuracy does not exceed ·02 of an inch in the actual model.

The hypsometrical map covers an area of forty-two square miles to a horizontal scale of 6-inch ordnance map. Vertically the measurements are $\frac{1}{16}$-inch to every 25 feet, which is nearly double the horizontal scale, in order to throw the indentations of the ground into the strongest possible relief. The map has no painted features, being finished uniformly in gray, and even the river-beds are represented by actual indentations. The whole effect is as if one were looking down upon the district from a balloon on a clear, moonlight night.

Some details as to the method of construction of this model may be interesting. It is built up of a series of layers of cardboard, the majority of which are $\frac{1}{16}$-inch thick, some being $\frac{1}{8}$-inch where it was possible to obtain sufficiently close contours at differences of level of 50 feet. In order to complete the model, 94 layers of cardboard were necessary, some of the layers consisting of a large sheet of board with a small indentation taken out; while the upper layers consist of a multiplicity of small sections, some of the size of a pin's head, each cut to contour lines. Under the circumstances it is not wonderful that between 500 and 600 pieces of cardboard were required to make up the formation of the model.

In order to build up the model, a wooden base or platform was first constructed, upon which the lowermost section could be placed. A sheet of tracing paper was then taken and laid over the ordnance survey map of the area, the contour lines corresponding to the lower level being traced. This tracing was then pasted carefully on a sheet of cardboard of the required thickness, and when dry the card was cut to contour line and mounted, by means of small tacks, on the base-board. The process of tracing, cutting, and tacking was repeated until the whole number of layers were mounted, the result being a laminated structure.

It will be apparent that the most painstaking accuracy was necessary at every stage of the process, as otherwise a precipice could easily become converted to a "ledgy" declivity, or *vice versâ*, by the non-registration of successive layers. The weight of cardboard so manipulated amounted to over a hundred pounds.

The next stage was to convert the sharply stratified model into a representation of the actual earth surface, smoothed to a greater or less extent by the erosion due to weather and water. This was done by applying a special preparation to the surface of the model, working it carefully to the slopes of the ground surface; and in order to render this faithfully, careful inspection of the ground was necessary. The result is a perfect representation of the actual formation of the ground. Over fourteen pounds of this special preparation were used in this work, and the weight of the whole model in its complete state is over a hundredweight and a half.

Accurate full-size copies of this model are now available, constructed in unglazed gray adamantine, which gives a strong and light model at a low price, and supplied by the Geographical Model Works, whose offices are at Emerson Chambers, Newcastle-on-Tyne.

NEXT MONTH.

Reviews of many new and important School Books.

BRITISH MUSEUM 27 SE 09

Crown 8vo, 348 pages, price 3s. 6d.

SCHILLING'S SPANISH GRAMMAR

Translated and Edited by FREDERICK ZAGEL.

The above work is a translation of Professor Schilling's Spanish Grammar, which is a standard work in Germany for the study of Spanish, and in a few years has run through more than twelve editions.

BY THE SAME AUTHOR AND TRANSLATOR.

Crown 8vo, 164 pages, price 2s. 6d.

SCHILLING'S "DON BASILIO."

A Practical Guide to Spanish Conversation and Correspondence.

This work was written by Professor Schilling as a companion reading-book to his Spanish Grammar. The work consists of two parts. In Part I., the main part, Don Basilio figures in dialogues of every description. The Second Part is devoted to business matters and correspondence.

THE HAMILTONIAN SYSTEM.

A Short and Easy Method of Learning a Foreign Language by a Close Interlinear Translation.

CÆSAR'S GALLIC WAR. Book I. With Text as well as Interlinear Translation. Limp cloth, price 1s.
Books I. to VI. Price 4s. 6d.
VIRGIL'S ÆNEID. Books I. to IV. Price 3s. 6d.
EUTROPIUS. Limp cloth, price 1s. 6d.
FLORIAN'S FABLES. Limp cloth, price 1s.
PERRIN'S FABLES. Limp cloth, price 1s. 6d.

Each Book contains the Text as well as the analytical, interlinear, and literal Translation.

Full List of the Series on application.

FRANCIS HODGSON, 89 Farringdon St., E.C.

NELSON'S

ALERT ARITHMETICS.

A New Series of Pictorial Arithmetics on a Novel Plan.

By HENRY WILKINSON.

Pupil's Book I. 48 pages. Cloth limp. **3d.**
Pupil's Book II. 48 pages. Cloth limp. **3d.**
Pupil's Book III. 48 pages. Cloth limp. **3d.**
Pupil's Book IV. 48 pages. Cloth limp. **4d.**
Pupil's Book V. 64 pages. Cloth limp. **4d.**

Teacher's Book I. 32 pages. Cloth limp. **4d.**
Teacher's Book II. 32 pages. Cloth limp. **4d.**
Teacher's Book III. 32 pages. Cloth limp. **4d.**
Teacher's Book IV. 32 pages. Cloth limp. **5d.**
Teacher's Book V. 51 pages. Cloth limp. **5d.**

The complete Plan of Work in this Series is that of Scheme B, with modifications suggested by long and practical experience.

Book VI. is in active preparation, and will contain many features quite novel in books of this class, all designed to make the work in Arithmetic both pleasant and practically useful.

THOMAS NELSON AND SONS,
35 and 36 Paternoster Row, London, E.C.;
Parkside, Edinburgh; Dublin; and New York.

This Month's Advertisers.

Publishers.	PAGE
Messrs. Allman and Son, Ltd.	xxvii
Messrs. G. Bell and Sons	Back of Supplement
Messrs. Blackie and Son, Ltd.	Back of Supplement
Messrs. Burns and Oates, Ltd.	xxvi
Messrs. Dent and Co.	xxv
Messrs. C. Griffin and Co., Ltd.	Cover 2
Mr. F. Hodgson	xxix
Messrs. W. and A. K. Johnston, Ltd.	xxv
Messrs. E. Marlborough and Co.	xxvii
Messrs. Meiklejohn and Holden	xxiv
National Society's Depository	xxviii
Messrs. T. Nelson and Sons	xxviii, xxix, xxx, Cover 3
Messrs. G. Philip and Son, Ltd.	xxvi
Messrs. J. Poole and Co.	xxv
Stead's Publishing House	xxvii

Tutorial Colleges.	PAGE
Burlington Correspondence College	xxvii
G. B. Clough's Correspondence College	xxiii

School Equipment.	PAGE
Book-keeping	xxvii
Educational Musical Instrument Co.	xxiii
Hypsometrical Maps	xxvii
"Koh-I-Noor" Pencils	xxiii
"Red Code" and Companion	xxvi
Singer Sewing Machines	Cover 2
Smith Premier Typewriter	Cover 4
"Swan" Fountain Pen	Cover 2

Miscellaneous.	PAGE
E. Evans' Pastilles	xxviii
Fry's Cocoa	Cover 1
Imperial Fine Art Corporation	(Inset)
Red, White, and Blue Coffee	xxviii

CHARGES FOR ADVERTISEMENTS.

	£	s.	d.
Page (Ordinary)	5	5	0
Back Page	6	6	0
Half Page	2	12	6
Quarter Page	1	7	6
One-eighth Page	0	15	0

**** Special Terms for Series on application.*

THE PRACTICAL TEACHER is published on the 25th of each month. Advertisements should reach the Office not later than the 10th of the month.

THOMAS NELSON AND SONS, 35 and 36 Paternoster Row, London, E.C.

Nelson's Coloured
BIBLE WALL PICTURES
FOR SCHOOL TEACHING.

The Series consists of 108 Pictures, arranged in 9 Sets of 12 each. Size, 23 by 31½ inches. They are bold in outline, and the subjects are treated in a simple, natural way, the religious character being kept in view. The colouring is bright, and great care has been given by the artists to the representation of dress, scenery, and surroundings, from a historical point of view.

LIST OF THE SERIES.

FIRST SET.

1. The Infant Jesus and the Shepherds.
2. The Babe in the Temple.
3. The Wise Men of the East.
4. The Boy Jesus in the Temple.
5. The Boyhood of Jesus at Nazareth.
6. John the Baptist.
7. The Baptism of Jesus.
8. The Temptation of Jesus.
9. The First Disciples.
10. The First Miracle.
11. The Cleansing of the Temple.
12. Jesus at the Well.

SECOND SET.

13. Adam and Eve.
14. Cain and Abel.
15. Noah and the Ark.
16. Abram Leaving Home.
17. Lot's Choice.
18. The Destruction of Sodom.
19. Hagar and Ishmael.
20. Abraham Offering Isaac.
21. Jacob Obtaining the Blessing.
22. Jacob's Dream.
23. Rachel at the Well.
24. Jacob and Esau.

THIRD SET.

25. Jesus in the Synagogue of Nazareth.
26. The Wonderful Healer.
27. First Draught of Fishes.
28. The Sermon on the Mount.
29. The Man with the Four Friends.
30. The Pool of Bethesda.
31. Through the Cornfields.
32. The Widow's Son.
33. The Sower.
34. Jesus Stilling the Storm.
35. Jairus's Daughter.
36. The Feeding of the Five Thousand.

FOURTH SET.

37. Joseph Telling his Dreams.
38. Joseph Sold by his Brethren.
39. Joseph in Prison — Interpreting the
40. Joseph the Ruler. [Dreams.
41. Joseph and his Brothers.
42. Jacob and Joseph Meet.
43. Jacob Blessing his Grandsons.
44. The Babe among the Bulrushes.
45. The Burning Bush.
46. The Passover Instituted.
47. The Crossing of the Red Sea.
48. Smiting the Rock at Meribah.

FIFTH SET.

49. Christ Walking on the Sea.
50. The Syrophœnician Woman.
51. The Transfiguration.
52. The Good Shepherd.
53. The Raising of Lazarus.
54. The Good Samaritan.
55. The Two Sisters.
56. Jesus Teaching to Pray.
57. The Prodigal Son.
58. The Ten Lepers.
59. The Pharisee and the Publican.
60. Christ Blessing Little Children.

SIXTH SET.

61. The Law Given on Sinai.
62. The Worship of the Golden Calf.
63. The Spies and the Grapes of Eshcol.
64. The Brazen Serpent.
65. The Death of Moses.
66. Crossing the Jordan.
67. The Taking of Jericho.
68. Gideon the Deliverer.
69. Samson's Death.
70. Ruth and Naomi.
71. The Child Samuel.
72. Saul Anointed King.

SEVENTH SET.

73. Blind Bartimæus.
74. Zacchæus.
75. Mary and the Alabaster Box.
76. The Triumphal Entry.
77. The Ten Virgins.
78. The Parable of the Talents.
79. Jesus Washing the Disciples' Feet.
80. The Last Supper.
81. The Garden of Gethsemane.
82. St. Peter's Denial.
83. Jesus before Pilate.
84. Jesus on the Cross.

EIGHTH SET.

85. David the Shepherd Lad.
86. David and Goliath.
87. David and Jonathan.
88. David Sparing Saul.
89. Death of Absalom.
90. Solomon Dedicating the Temple.
91. Queen of Sheba's Visit.
92. Elijah and the Ravens.
93. Elijah at Carmel.
94. Elijah at Horeb.
95. Elijah and Ahab at Naboth's Vineyard.
96. Elijah Taken up to Heaven.

NINTH SET.

97. Elisha and the Shunammite.
98. Naaman at the House of Elisha.
99. The Hebrew Children and the Fiery
100. Belshazzar's Feast. [Furnace.
101. Daniel in the Lions' Den.
102. Rebuilding the Walls of Jerusalem.
103. The Burial of Jesus.
104. The Empty Tomb.
105. The Journey to Emmaus.
106. Jesus and St. Thomas.
107. Jesus and St. Peter.
108. Our Lord's Ascension.

THE PRICES ARE AS FOLLOWS:—

12 Pictures on one Roller . . . . . 8s. net.
12 Pictures, Metal-rimmed top and bottom . . . . . 11s. net.
12 Pictures on one Roller, mounted on Linen . . . . . 14s. net.

☞ *Any Single Picture, or any Selection of Pictures from the 108 titles, can now be obtained to order.*

PLEASE APPLY FOR DAINTY COLOURED ILLUSTRATED CATALOGUE, POST FREE.

T. NELSON & SONS, 35 & 36 Paternoster Row, LONDON, E.C.

The Casket of Memory.

"The memory of a child is a casket of great price, and only the most precious pearls of poetry ought to be enshrined in it."

Teachers who wish to carry out the new ideas on the teaching of poetry, which are well summed up in the above quotation from a well-known educationist, ought to use Messrs. Nelson's new series of Poetry Books

A CYCLE OF SONG.

A Complete School Anthology of the best Verse, arranged in Twenty-four Parts.

Each 48 pages. Paper, 2d. Limp cloth, 3d.

List of the Series.

1. **Songs of the Nursery.**
2. **Songs of Girlhood.**
3. **Songs for Boys and Girls.**
4. **Songs of Youth.**
5. **Songs of Maidenhood.**

The above five Parts form a graduated collection suitable for children of from seven to fourteen years.

6. **Stories in Song—Part I.**
7. **Stories in Song—Part II.**
8. **Songs of England.**
9. **Songs of Scotland.**
10. **Songs of Britain.**
11. **Songs of the Empire.**
12. **Songs of the Nations.**
13. **Songs of the Border.**
14. **Songs of Dreamland—Part I.**
15. **Songs of Dreamland—Part II.**
16. **Songs of Endeavour.**
17. **Songs of Quiet.**
18. **Songs of the Streams.**
19. **Sacred Songs.**
20. **Songs of the Seasons.**
21. **The Poet's Lyre.**
22. **Songs of the Sea.**
23. **Songs of the Country.**
24. **Songs of the City.**

Each volume is really a miscellaneous collection loosely connected by the central thought embodied in the title.

The story-poem is kept well in evidence throughout the Series.

The booklets are printed in clear, large, and well spaced type.

Teachers drawing up schemes of work in literature are recommended to send for the Prospectus of "A CYCLE OF SONG," which contains the titles of all the poems in the series, and suggests new and attractive arrangements of school work in poetry.

THOMAS NELSON AND SONS,

35 Paternoster Row, London, E.C.; Edinburgh, Dublin, and New York.

THE
Smith Premier
Typewriter.

The World-wide reputation of the Smith Premier is based upon perfection of design and excellence of manufacture.

The New Number 10 Model

embodies the most advanced ideas in typewriter construction, and not only meets existing demands but anticipates those of the future. All the time-tested and proved Smith Premier Features are retained, and amongst the many valuable improvements added are:—

ABSOLUTELY VISIBLE WRITING,

BALL-BEARING TYPEBARS,
COLUMN FINDER AND PARAGRAPHER,
INTERCHANGEABLE CARRIAGES,
BACK SPACER,
GEAR DRIVEN CARRIAGE (no straps),
DEVICE FOR RAPID CORRECTION OF ERRORS,
LIGHTNING ESCAPEMENT, Etc., Etc.

You will find it to your advantage before buying a typewriter to send for our Illustrated Catalogue; or, better still, to call at our nearest office to see the machine.

No Typewriters (other than those manufactured by the Smith Premier Typewriter Co.) can be legally described as "THE SMITH," or "THE SMITH PREMIER," without infringing our Registered Trade Marks "Smith" and "Smith Premier."

The Smith Premier Typewriter Co.,
SMITH PREMIER HOUSE,
6 & 7 Queen St., Cheapside, London, E.C.

COUPON
PRACTICAL TEACHER
October 1909

PRINTED AND PUBLISHED BY THOMAS NELSON & SONS, PROPRIETORS, AT THE OFFICE OF "THE PRACTICAL TEACHER," 35 & 36 PATERNOSTER ROW, LONDON, E.C.